SHORT TERM OUTCOMES OF CHILDREN AGED 6 TO 59 MONTHS WITH SEVERE ACUTE MALNUTRITION MANAGED IN OUTPATIENT THERAPEUTIC PROGRAM (OTP) IN KWALE COUNTY, KENYA

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DECLARATION

This dissertation is my original work and has not been presented for a degree award

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I dedicate this work to my ever-supporting mother Ms Gladys Mbuche, my loving wife Ms Fatuma Swazuri, and our loving children Yasmin, Halima and Khalid for their patience and prayers.

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ABBREVIATIONS AND ACRONYMS

CMAM   Community Management of Acute Malnutrition

GOK   Government of Kenya

HAZ   Height for age Z-score

IMAM   Integrated Management of Acute malnutrition

KDHS   Kenya Demographic and Health Survey

MOH   Ministry of Health

MUAC   Mid Upper Arm Circumference

OTP   Outpatient Therapeutic Program

RUTF   Ready to Use Therapeutic Food

SAM   Severe Acute Malnutrition

UNICEF   United Nations International Children's Emergency Fund

WAZ   Weight for Age Z score

WHO   World Health Organization

WHZ   Weight for Height Z score

OPERATIONAL DEFINITIONS

Severe acute malnutrition is undernutrition determined by WHO reference classification WHZ < - 3 SD, or MUAC < 11.5cm, or visible severe wasting and/ or presence of nutritional oedema. This study will utilize references of WHZ < - 3 SD and/ or MUAC < 11.5 cm to define severe acute malnutrition.

Mid upper arm circumference: the circumference of the upper arm taken midway between the olecranon process and the acromion using a color-coded tape. Left arm is used to measure MUAC in this study which is the standard.

Outpatient Therapeutic Program: Nutritional intervention program for children with severe acute malnutrition without complications, which involves one weekly clinic review at an outpatient set up (such as nutrition clinic), issuing of ready-to-use-therapeutic-food (RUTF) and other medical interventions. Proposed duration is 4 to 6 visits as per Sphere standards. This study will follow up clients at OTP clinic for 4 weeks.

Appetite test: Appetite is the natural desire to satisfy a bodily need, in this case, feeding. Appetite test is the objective test administered by giving a specified amount of therapeutic food to the child over 30 minutes to one (1) hour then assessing amount of food the child consumes. It is scored as pass or fail for good and poor appetite respectively at a 50% cut off of a portion measured per body weight.

Outcome: Outcome measures for this study will be recovered, rate of weight gain, fail, admission into inpatient care, defaulter or death.

Recovered: a child achieves a WHZ above – 3 SD, or MUAC above 11.5cm, and no nutritional edema for two consecutive weekly visits. A recovered child attains discharge criteria from Outpatient Therapeutic Program.

Defaulter is a participant on follow up at OTP clinic but is absent at the 2 weekly visits during the study and confirmed that the patient is alive and not admitted into in patient.

Admission into inpatient is when a participant develops complications while on OTP clinic follow up and gets admitted into the ward. These include development of new or worsening nutritional edema, or other clinical deteriorations such as severe anemia leading to admission to the wards.

Fail is a participant who has not recovered (as defined above) after adequate Outpatient Therapeutic Program intervention for a period of 4 to 6 weeks. This study will evaluate outcomes at 28 days of OTP clinic follow up hence 'fail' will be described as at 28 days.

ABSTRACT
Background and Rationale
Acute malnutrition, is associated with increased frequency and severity of infections, contributing to delayed recovery from illnesses as well as an increased risk of death. Under-5 mortality rate stands at 41 deaths per 1,000 live births worldwide as recorded by UNICEF in 2016 with 1 million deaths estimated to occur annually due to malnutrition associated complications.

Integrated Management of Acute Malnutrition (IMAM) Kenya guidelines incorporate Outpatient Therapeutic Program (OTP) for continued care for children with severe acute malnutrition in the absence of life-threatening complications. The guidelines outline parameters for defining a successful Outpatient Therapeutic Program which include rate of weight gain, proportion of those who recover, default or die as well as duration of follow up at nutrition clinic.

Kwale county has continued to record high prevalence of wasting and severe wasting documented at 4.4% and 0.8% respectively in the Kenya Demographic and Health Survey of 2014. Regular nutritional surveys by the Ministry of Health still report high prevalence in the county. However, there are no studies evaluating the outcomes of Outpatient Therapeutic Program undertaken in Kwale County despite the continued high prevalence of wasting. This study is a step in covering the void.

Objectives
The primary objective of the study was to estimate the proportion of children who recover (achieve WHZ more than – 3 SD and / or MUAC above 11.5cm) following nutritional rehabilitation at Outpatient Therapeutic Programs in three (3) major hospitals in Kwale county. Secondary objectives were to evaluate the rate of weight gain (g/kg/day) at OTP centres, and the proportion of children who are admitted for inpatient care, default from follow up, or die within the first 28 days of follow up at the nutrition clinics.

Methodology
By employing a prospective longitudinal study design, children were enrolled as they were booked in at the nutrition clinic and followed up 2 weekly at the OTP centers for the first 28 days to determine their outcomes. A sample size constituted 161 children aged between 6 months to 59 months with non-complicated severe acute malnutrition. Data was collected using a pre-tested semi structured questionnaire administered to the caregivers capturing information on demographic, socioeconomic, socio cultural factors relating to child nutrition, and medical histories of the children. Nutritional evaluation of the children included physical examination, anthropometric measurements (weight, height, WHZ score, MUAC) and administration of the appetite test.

Results
Among the 161 children enrolled into the study and followed up for 28 days 70 (43.48%) recovered, 55 (34.16%) defaulted from follow up, 5 (3.11%) got admitted, 5 (3.11%) died and 3 (1.86%) were transferred to other OTP centers. Twenty-three (14.29%) failed treatment remaining at WHZ score of – 3 SD and below.

The average rate of weight gain was 5.8g/kg/day.

Conclusion and Recommendations
This study recorded a low recovery rate at 43.5%. Factors associated with recovery were appropriate breastfeeding practices, residence within 10 km radius from the clinic, good uptake of RUTF, administration of amoxicillin and administration of vitamin A.

Poor outcomes were associated with several factors including age above 12 months, initiation of complementary feeding before age 6 months, inappropriate breastfeeding status, distance more than 10 km, presence of diarrhea, poor uptake of ready to use therapeutic food (RUTF), lack of routine administration of amoxicillin and or vitamin A to the children at OTP.

Improved access to nutrition services and follow up for children with severe acute malnutrition, including adoption of community health volunteers (CHVs), sensitizing the community on infant and young child nutrition (IYCN) and health seeking behavior, as well as improving the application of IMAM guidelines at the OTP centres including routine use of amoxicillin may improve outcomes of children undergoing nutritional rehabilitation at the OTP centers.

1.0 INTRODUCTION

1.1 Background

Suitable nutrition is valuable to children's growth and development. Right from birth, nutrition is especially important to achieve overall physical, mental, and cognitive growth, health, and development. (1) Nutritional deficiencies interfering with optimal growth predispose to malnutrition with its accompanying complications. This is associated with increased frequency and severity of infections, contributes to delayed recovery from illnesses and increased risk of death. (2) The increased risk of death is noted to persist even upon stabilization of complicated severe acute malnutrition even after discharge and reintegration back into the community. (3)

Acute malnutrition also defined as wasting, is described by weight-for-height ratio. The weight-for-height ratio indicates body mass in relation to body height or length. It describes acute nutritional status of a child. Weight for height Z-score below – 2 SD is referred to as wasting while that below – 3 SD is severe wasting. Wasting represents inadequate nutrient intake in the recent past mainly resulting from inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition. (4)

Under-5 mortality rate stands at 41 deaths per 1,000 live births worldwide as recorded by UNICEF in 2016 with 1 million deaths estimated to occur due to malnutrition associated complications annually. (5) Malnutrition is associated with 30% - 50% case fatality rates among affected children due to several factors, either directly or indirectly. (5) A malnourished child has a weak immune system that is vulnerable to infection, as well as slow and incomplete response to medical interventions. Diarrheal disease and pneumonia constitute the most common complications of severe acute malnutrition. (3) Other complications associated with severe acute malnutrition include poor appetite, mouth sores, wounds, sepsis, micronutrient deficiency, electrolytes imbalances, anemia, and cardiomyopathy that leads to heart failure. (6)

1.2. Epidemiology of malnutrition; global and local references

According to UNICEF global statistics of 2016, wasting affected 52 million children under 5 years globally giving a prevalence of 7.7 per cent, of whom 17 million had severe wasting giving a prevalence of 2.5 per cent. About one quarter of the severely wasted children lived in sub-Saharan Africa. (5)

Nationally, the Kenya Demographic and Health Survey (KDHS) 2014 recorded 30.8% of children under 5 years as stunted, 13.6% as underweight and 4.5% as wasted, with 0.8% as severely wasted. Kwale County recorded stunting at 29.7%, underweight at 11.8%, wasting at 4.4% and severe wasting at 0.8%. (7)

A nutritional survey in Kwale County conducted by the Ministry of Health in 2012 compiled data showing prevalence of wasting as 9.1% and severe wasting as 2.7%. (8) Wasting levels are highest among children in the age groups 6-8 months and 9-11 months due to inappropriate complementary

feeding practices, which include inadequate food quality and quantity, as well as an increased disease vulnerability in this age group. (5) ,(8) ,(9)

Table 1: Comparison of nutrition status of children globally and within Kenya.

	Worldwide (2016) (5)	Kenya (2014) (7)	**Kwale (2014)** (7)	**Kwale (2012)** (8)
U5MR (/1,000 live births)	41	49		
Early initiation of breastfeeding (by 1 hour) (%)	45	62		**89.6**
Exclusive breastfeeding (at 6mo) (%)	40	61		**52.3**
Complementary feeds initiation (6-8mo) (%)	66	80	-	-
Acceptable diet (%)	17	22		**48.8**
Wasting WHZ (%)	7.7	4.0	**4.4**	**9.1**
Severe wasting WHZ (%)	3	1.0	**0.8**	**2.7**

1.3 Causes of malnutrition
Several factors interplay to influence nutrition of children, either directly or indirectly both as cause as well as affecting outcomes of nutritional rehabilitation. At the macro (societal) level, these factors are potential resources such as environment, people and technology, as well as the quantity and quality of actual resources such as accessibility of nutritional rehabilitation services, human capacity, economic and organizational framework and how they are controlled. At the household (family) level, factors noted include access to food, appropriateness of maternal health and child care practices, water sanitation, and adequacy of health services factoring opportunity cost. The immediate factors at individual level is an interplay of dietary intake and occurrence of disease and there management. (2)

Nisha Malhotra et al in a study titled 'Inadequate feeding of infant and young children in India', a prospective observational study in 2012, identified statistically significant factors affecting childhood nutrition rehabilitation to include low level of education of the mother, low level of knowledge on infant feeding practices, a working mother, household with more than 3 children under five years, low socioeconomic status, starting complementary feeds late, and an underlying infection or illness in the child. The study further showed that infant and young child feeding practices are more associated with absence of knowledge on nutrition than affordability of food. (10)

Ndemwa et al on evaluation of nutritional status and associated demographic characteristics of malnutrition among children less than 24 months in Kwale County in 2017 noted that caretaker's low level of education and a caretaker who is in formal employment was related to higher prevalence of malnutrition and lower recovery rates on nutritional rehabilitation. (11)

History of a preceding illness has been reported among all children admitted for complicated severe acute malnutrition with an average of 30.36 days prior. (12) Chronic illness such as tuberculosis and HIV/AIDS have a causal as well as outcome effect on malnutrition due to increased metabolic demands following the antecedent inflammatory response and accompanying opportunistic infections. (12)

Most prevalent illnesses in children admitted with complicated severe acute malnutrition are diarrheal disease and pneumonia at 70.3% and 51.4% respectively as recorded by Nzioki et al in an audit on protocol on management of severe acute malnutrition at Kenyatta National Hospital. (13)

Travel distance to the nearest health care facility is a substantial influence on health seeking behavior as well as seeking care for nutritional rehabilitation, and has been associated with adverse outcomes including mortality. Anja Schoeps et al observed in a study in Burkina Faso with a median travel time of 60 minutes that mortality hazard increased by a factor of 1.12 for each additional hour travelled to assess health care services. Travel time and distance in the 39 villages studied were highly corelated. (14)

In an investigation of defaulting in a CMAM program in Northern Nigeria using semi quantitative evaluation of access and coverage (SQEAC) tool in 2012, Valid international and UNICEF noted higher rates of defaulting in the first two (2) visits after enrolment with diverse factors associated with defaulting. These factors included challenging terrain and longer distances to health care facilities, lack of money for transport, poor overall as well as malnutrition treatment seeking behavior, in addition to absence of RUTF at facilities making care givers discouraged to come back. (15)

1.4 Overview of Management of severe acute malnutrition
Severe acute malnutrition is a life-threatening medical condition that needs urgent medical attention to prevent mortality. The average under-five case-fatality rate attributed to severe acute malnutrition is recorded to range from 30% to 50%. This is expected to reduce when metabolic and physiological derangements are appropriately addressed during management. Management of severe acute malnutrition according to WHO management protocol is reported to decrease the case fatalities by 55% in the hospital settings. (6) According to Sphere standards, a successful outpatient therapeutic program for management of non-complicated severe acute malnutrition should have a mortality rate of not more than 10%, recovery rate of at least 75% and default rate of not more than 15%. (16) The Sphere standards are international humanitarian best practice guidelines formulated to help improve on accountability and overall quality of humanitarian response to those affected by disasters, and incorporates good nutrition and food security.

The Kenya national guidelines for malnutrition provides for inpatient admission for cases of severe acute malnutrition with complication for inpatient management at County referral hospitals and tertiary hospitals. Inpatient management protocols for these children are provided within the Integrated Management of Acute Malnutrition (IMAM) guidelines, the Emergency Triage And

Treatment (ETAT) guidelines, and the Integrated Management of Childhood Illnesses (IMCI) guidelines. The guidelines highlight on criteria for admission in to inpatient care, ten steps of routine care, discharge to outpatient nutrition care, and discharge from all nutritional care.

The IMAM guidelines further outline protocol on outpatient therapeutic program for rehabilitation of non-complicated severe acute malnutrition. This highlights on enrollment criteria to the clinic, clinical assessment of the child, socioeconomic as well as demography of the care giver, routine management at the clinic, follow up, end point for discharge, an outline of expected outcomes in an outpatient therapeutic program among others.

Criteria for enrollment into outpatient therapeutic program for a child with severe acute malnutrition include;

1. No serious illnesses, or health complications are resolved,
2. No severe pitting oedema,
3. Good appetite, clinically well child and alert,
4. Reasonable home situation and a willing care giver. (17)

Enrollment into OTP can be children on continuation of nutritional rehabilitation after stabilization of complicated malnutrition in the ward, referral from maternal and child health clinic, as well as referral from under-fives outpatient clinic.

Criteria for discharge from outpatient therapeutic program is a well child with either MUAC >11.5cm, or weight for height Z score above – 3 SD, and no oedema for two consecutive one weekly visits. (17)

Discharge from all nutritional programme and follow up is when a child is feeding effectively, has satisfactory weight gain, a weight for height above – 2 SD, or MUAC above 12.5cm. (17)

1.5 Problem statement

Prevalence of global acute malnutrition as well as severe acute malnutrition in Kwale County has continued to be higher than the national prevalence as captured in Nutrition Situation Reports for Arid and Semi-Arid areas by the Ministry of Health conducted yearly. (18) The reasons identified for such high prevalence of wasting include inadequate dietary intake, diseases such as diarrhea and malaria, insufficient health services such as poor uptake of vitamin A supplementation, inadequate human capital as well as normal shocks affecting food availability such as poor crop harvest. (18)

A nutritional survey in 2012 identified on average, only about a half, 51.5% of the children in the age group 6-59 months feed the recommended number of meals per day, while only 48.6% consume foods containing the recommended minimum of four food groups. (8) This is a major contributor of high prevalence of malnutrition equally affecting outcomes of malnutrition management and is totally unacceptable.

In the County, cases of malnutrition including at risk children are enrolled in to feeding programs at different public health facilities in the County, however the enrolment is still low. Of the malnourished children, only 5.3% were in Outpatient Therapeutic Program catering for severe wasting and 7.9% in Supplementary Feeding Program catering for moderate wasting as documented in the nutrition survey of 2012. (17)

The clinics attend to those who happen to come, with the fall out rate estimated to be about 40% within the first month of follow up. (8) The reasons for the loss to follow up are not well documented, and it's not known whether it may be due to mortalities related to complications of malnutrition.

This study is a step in trying to cover the gap in knowledge regarding such a trend in childhood
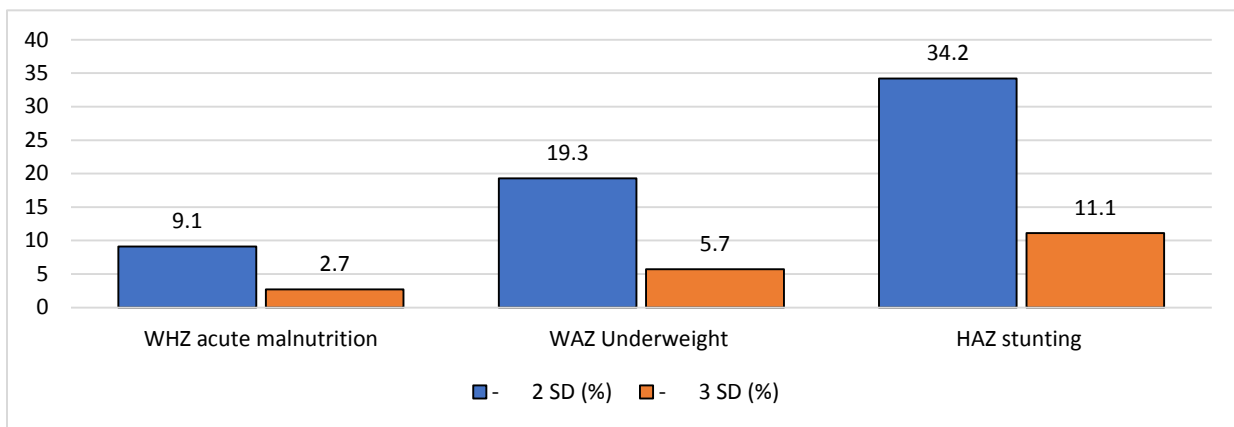
malnutrition management in Kwale County.

Figure 1: Bar Graph showing prevalence of malnutrition in percentage, Kwale County, 2012 (8)

Table 2: Infant and Young Children feeding practices (%), Kwale County, 2012 (8)

Exclusive breastfeeding for children<6 months	52.3%
At least 2 meals a day for 6-8 months old (breastfed children)	63.5%
At least 3+ meals a day for 6-23 months old (breastfed children)	43.8%
4+ meals a day for children 6-23 months (non-breastfed children)	21.7%
Consuming 4+ food groups (breastfed and non-breastfed children respectively)	48.6%

2.0. LITERATURE REVIEW
2.1. Outlook of Community Management of Acute Malnutrition

WHO endorsed community-based management of acute malnutrition in the absence of complications in the year 2005. (19) Such intervention model is aimed at improving on coverage and access to nutritional services before complications set in, offer opportunity for early and safe reintegration of a child stabilized from complicated severe acute malnutrition managed in the inpatient set up, improve on opportunity cost at family level in regard to review and follow up of the children on malnutrition interventions resulting in a more satisfied caregiver, reduced dependence on the already overstretched staff and hospitals in the inpatient set up. Overall, targeting to reduce malnutrition prevalence as communities participate as well disseminate relevant health information. (19) This is achieved through case identification of moderate and severe acute malnutrition within the community by employing screening activities such as measurements of children's MUAC by Community Health Workers, prompt nutritional intervention including dietary counseling, issuing supplementary and therapeutic foods, close monitoring and follow up.

In 2008, Kenya under the stewardship of Ministry of Public Health and Sanitation (MoPHS) incorporated integrated management of acute malnutrition (IMAM) in to its health care programs. (20) IMAM was combined with other sector strategies as part of High Impact Nutrition Interventions (HINI) in 2010, which were included under Infant and Young Child Nutrition (IYCN) as well as in the prevention and control of micronutrient deficiencies programs. A UNICEF study in 2010 and 2011 evaluated components of IMAM including Community outreach and Outpatient treatment for SAM cases without medical complications within Kenya. In general, favorable results were recorded in coverage, uptake, as well as outcomes of severe acute malnutrition management, albeit with some challenges. Kinango district in Kwale County was among sites that had less than 50% coverage due to its vastness. (20)

Presence of serious illness and health complications in severe acute malnutrition necessitates inpatient care. WHO ten steps of care for in patient interventions for complicated severe acute malnutrition target 5 – 7 days of stabilization then nutritional rehabilitation is instituted. The child is discharged soonest possible when complications have resolved, there is good appetite, and acceptable weight gain of at least 5 g/ kg/ day in 3 consecutive days. (17) Severe malnutrition shall not have resolved, and it is here that outpatient therapeutic programs are incorporated. The child is given ready to use therapeutic feed (RUTF) in addition to other medical interventions including vitamin A supplements and antibiotics.

Follow up is done weekly at a nutrition clinic with a target of achieving a WHZ score above – 3 SD, and/or increase in MUAC to 11.5 cm and above, and achieving a weight more than 85% of expected for age as per the WHO standard growth curves. (19) The expected duration of follow up is 4 to 6 weeks as per Sphere standards. (16)

The Sphere project describes successful outpatient therapeutic program as one that has duration to recovery of 3 to 4 weeks, rate of weight gain of at least 8 g/kg/ day, recovery (achieving more than

WHZ – 3 SD) of more than 75% of children enrolled within 4 to 6 weeks of follow up, defaulter rate of less than 15% and case fatality rate of not more than 10%. (16)

Comparing outpatient vs inpatient management of severe acute malnutrition, a systematic review in 2005 noted a study in Malawi that reported 72% recovery rate of severely malnourished children managed in outpatient care during the rehabilitation phase of treatment compared to 49% reported for the inpatient based care at eight weeks. (21)

In a comparative quality analysis of barriers to access treatment services for severe acute malnutrition in Pakistan and Ethiopia in 2014, Chloe Puett et al identified the following barriers; long distances (2.3km), high opportunity costs, lack of knowledge of services, lack of knowledge of malnutrition, child's refusal of ready-to-use-foods, as well as less programme exposure. (22) The study concluded that integration of severe acute malnutrition treatment services to other community services as recommended by the United Nations improves access and suggested the need for dedicated funding for the Community components. (22)

2.2. Therapeutic Feeding Centers

In the past, there were therapeutic feeding centers through Family Life Training Program of Ministry of Social Services across the country that had a significant impact on management of acute malnutrition. (23) Districts that recorded high prevalence of severe acute malnutrition were included for the program, including Kwale County.

The family life training centers (FLTC) acted as a therapeutic feeding center and a family life education center for nutrition, health and agriculture. A malnourished child once identified would be housed together with a caregiver mostly the mother, get facilitation for management of acute illness, health education, feeding assistance such as food types, food preparations and food combinations using locally available foods, as well as farm activities to empower them on food production using locally available crops. (23)

The FLTC employed a seamless system of case identification in the community by use of community health workers and the mother who had been admitted with her child once reintegrated back into the community. Referrals from discharged mothers was consistently being recorded as the highest mode of capturing malnourished children early, as much as 90%. (23) In this manner, health and nutritional education was well achieved together with timely referrals of malnourished children before full blown severe wasting set in.

The Family Life Training Centre offered 11 – 13 education courses to the mother in a targeted 3 weeks admission period. Cure rates were recorded as high as 90%, with weight gains of at least 300gms per month in the subsequent one year after discharge. (23)

The program also incorporated sibling admission for play stimulation of the index child, as well as screening for malnutrition, and it was recorded that the sibling would have severe acute malnutrition or moderate acute malnutrition with a prevalence of 27% and 41% respectively. (23)

2.3. Reviewed studies on outcomes of management of non-complicated severe acute
malnutrition in the Outpatient Therapeutic Program (OTP)

Several researchers have evaluated outcomes of children with severe acute malnutrition to document success of outpatient therapeutic programs as well as relate the different outcomes and their associated factors.

In a review of implementation of community management of acute malnutrition (CMAM) advisory service program in Malawi, Collins et al evaluated outcomes of all children with acute malnutrition enrolled from 2006 to 2013 after 6 weeks of nutritional intervention. The review recorded coverage of 80% in the target community, enrolling over 400, 000 children and a recovery rate of more than 80% each year.

In 2013, 85.3% of children enrolled with severe acute malnutrition recovered and achieved WHZ above –3 SD, and /or MUAC above 11.5cm, while 7% defaulted and 2.5% died. (21) The study concluded that community management of acute malnutrition is beneficial and was adopted by the Ministry of Health of Malawi. (21)

UNICEF conducted a longitudinal study in Kenya in 2010 to 2011to assess performance of integrated management of acute malnutrition (IMAM) and to note outstanding successes, good practices in undernutrition management, deficits and challenges in scaling up IMAM in Kenya. (20) Data were obtained from observations during site visits, health system databases, secondary sources and interviews with stakeholders involving 21 sites in nine participating districts. Outcomes from outpatient management of severe acute malnutrition recorded an average of 80.7% recovery rate, 1.5% death rate and 13% default rate. (20)

Follow up of post discharge growth and mortality after treatment for severe acute malnutrition (FuSAM study) in Malawi, evaluated outcomes after discharge and the associated factors. (24) Marko Kerac et al in July 2006 to March 2007 enrolled in to the study a cohort of 1,187 children to an in-patient based severe acute malnutrition treatment center and followed the children up to 1 year after discharge. The study recorded inpatient mortality of 23.2% of the 1,187 children. Of the surviving children, 71.5% met criteria for enrolment into outpatient therapeutic program which included use of RUTF. Cure rate with achievement of WHZ above – 3 SD and/ or MUAC above 11.5cm was at 64% by six (6) weeks, and these children were discharged from the one weekly OTP program. Not cured (5.1%), transfer out (1.2%) and defaulters (9.8%) comprised the result "failure" of 17.1%, while readmissions for inpatient care were 7%. In the mortalities during follow up, 25% occurred in the first 90 days after discharge, showing the extent of vulnerability of the wasted child, while presence of HIV was associated with a mortality risk of 62%. The study established that age

below 12 months, severe complicating illness and presence of other disabilities had a higher risk of poor outcome and death. (24)

Nalwa et al in a prospective cohort study of a therapeutic feeding program in Mathare valley in Nairobi Kenya between December 2009 to May 2010 evaluated outcomes of outpatient management of severe malnourished children aged 6 months to 59 months. (25) The study reviewed outcomes after 4 weeks of enrollment, and recorded recovery (improving WHZ above – 3SD and/or MUAC increase to more than 11.5cm) at 57.5%, defaulters at 6.5%, deaths at 1.6% and hospitalization for inpatient care at 0.8%. It was noted that a child taken ill with either diarrhea, cough, or fever had a lower rate of weight gain during the follow up. (25)

Mbaya et al investigated the outcomes of children with severe acute malnutrition being managed in outpatient program in Kitui County hospital in 2015. (26)The longitudinal prospective study followed up enrolled children for one month revealing a recovery rate of 73.3%, rate of weight gain of 5.1g/kg/day, and default rate of 2.8%.The study highlighted better recovery of severe acute malnutrition where the care giver is a house wife, when initiation of complementary foods was at 6 months of age, care givers' understanding of no difference in feeding between gender of children, no prior illness in the previous one month and routine use of amoxicillin as recommended in the Kenya IMAM guidelines. (26)

Table 3: Summary of reviewed studies on Outpatient Therapeutic Programs for management of non-complicated Severe Acute Malnutrition

Author, Study location, Study title, year of study	Study description	Study population	Results
Malawi, Collins et al, Scaling Up Community-Based Management of Acute Malnutrition; Implementing the CMAM Advisory Service Program in Malawi. 2015 (27)	Review of CMAM program rolled out 2006 – 2013. Outcomes evaluated at 6 weeks of follow up Longitudinal study. CMAM adopted by MoH, Malawi.	Reviewed 29 districts, 80% coverage of health facilities including 400,629 children less than 5 yrs.	At least 80% recovery rate by 6 weeks of CTC. The year 2013 had Recovery rate 85.3% Default rate 7% Death rate 2.5%
Kenya, UNICEF evaluation report. Evaluation of Integrated Management of Acute Malnutrition 2012 (20)	Evaluation to assess IMAM performance in scaling up IMAM in Kenya. Longitudinal study. Four components assessed, including Community outreach and Outpatient	IMAM performance data was analyzed from January 2010 to December 2011 from 21 sites in nine districts. 111,336 cases of SAM evaluated. Data obtained from secondary sources, health	IMAM is effective. Outpatient treatment achieved recovery rate 80.7%, default rate 13% death rate 1.5%. Coverage by health facilities in OTP is less than 50%; Kinango district is at 10-20% coverage.

	treatment for SAM cases without medical complications.	system databases, observations during visits and interviews.	
Malawi, (FuSAM Study) Marko et al Follow-Up of Post-Discharge Growth and Mortality after Treatment for Severe Acute Malnutrition. 2014 (24)	Prospective Cohort Study. Children hospitalized and managed for SAM, followed up for 1 year for clinical outcomes, and evaluation of associated factors for the varied results. Result entered as per outcome reached within the 1 year of follow up.	Cohort of 1187 admissions of SAM for inpatient-based treatment in Blantyre, Malawi between July 2006 – March 2007. Hospitalization, enrollment into OTP, discharged from all nutritional interventions, followed up for 1 yr	In patient deaths 23.2 % Survivors enrolled into OTP 71.5% Outcomes by 90 days - Cured 64 %; Not cured 5.1%; Transfer out 1.2%; Defaulter 9.8%; Readmission 7 %. 25% of death occurred in first 90 days post discharge. HIV related deaths 62% overall. High risk – Age < 12 months, severe illness, & presence of disability.
Kenya, Nalwa et al, Outcomes of severe malnourished children 6 – 60 months on Outpatient Management in Nairobi. 2012 (24)	Prospective cohort study of a therapeutic feeding program in Mathare Valley, Nairobi between Dec 2009 – May 2010. Reviewed rate of weight gain, WHZ change, MUAC change in a 4 week follow up.	Consecutive enrollment of all children attending the therapeutic feeding program capturing 133 children with SAM.	Average rate of weight gain 3.7g/kg/d Increase in WHZ 0.86cm, Increase in MUAC 0.7cm Recovered 57.5% Defaulter 6.5% Mortality 1.6% Admission 0.8%
Kenya, Mbaya et al, Outcomes of severely malnourished children aged 6 – 59 months on outpatient management program in Kitui County Hospital. 2015 (26)	Longitudinal prospective study of OTP in a County hospital investigating outcomes of nutrition interventions in a 4 week follow up and associated factors.	104 children with severe acute malnutrition attending outpatient therapeutic program were enrolled.	Average rate of weight gain 5.1g/kd/d Recovered 73.3% Defaulter 2.8% Better recovery – caretaker is housewife, complementary foods initiated at 6 months age, understanding that there is no difference in feeding between genders, no illness in the one month of follow up, use of amoxicillin during OTP.

CMAM – community-based management of acute malnutrition.
CTC (community therapeutic centers) and OTP (outpatient therapeutic centers) are medical centers that are dedicated to the outpatient management of non-complicated severe acute malnutrition.
IMAM – integrated management of acute malnutrition are guidelines that outline unified approach to management of severe acute malnutrition, adopted globally with reference to WHO guidelines and customized to suit a particular country or situation.
MUAC (mid upper arm circumference) and WHZ (weight for height standard deviation score) are clinical measures used to objectively diagnose malnutrition and aid in its follow up as treatment is instituted.
SAM – severe acute malnutrition as defined by WHO parameters of WHZ < - 3 SD, MUAC < 11.5cm, presence of visible severe wasting and or nutritional oedema.

2.4.   Theoretical framework

The concept of the study borrows from the understanding that nature and nurture are in constant interplay affecting child's growth and development both positively and negatively as described by Arnold Sameroff in transactional model of development. (27) The macro to specific causes of malnutrition in children as demonstrated by UNICEF in 1998 validates the influence of government system, the society at large, the family up to the individual child in the cause and outcomes of malnutrition. (9)

The economic status of the family, social aspect of the family including family size, cultural factors including infant and young child nutrition (IYCN) practices are among independent variables that this study will evaluate.

Demographic characteristics notable to influence on cause and outcome of malnutrition in a child includes elements such as who the primary caregiver is, a stay home mother or working mother, as well as level of formal education of the caregiver.

In the dietary management of severe acute malnutrition, consumption of ready to use therapeutic foods (RUTF) is key in influencing outcomes, where by refusal of RUTF by the child and sharing of the RUTF with siblings have been associated with unsatisfactory outcome.

Co-morbidities such as diarrheal disease affect malnutrition management negatively and needs to be identified and specific interventions instituted. Severe acute malnutrition is an immune deficient state where infections harbor and the body mounts limited immune response to. Guidelines in management of SAM identify the role of routine administration of antibiotics and vitamin A supplementation to improve healing. (17) Negative nutritional effects of measles in children are well known and have higher chance of complication in the child with severe acute malnutrition.

Administration of measles vaccine has been shown to minimize the untoward effects of the disease, and guidelines describe how to update measles vaccine administration in a child on therapeutic feeding program for severe acute malnutrition.

This study will evaluate these independent variables relating them to the severity of severe acute malnutrition and the influence they have on the outcomes of non-complicated severe acute malnutrition management at the outpatient therapeutic program.

2.5.   Conceptual frame work
Figure 2: Conceptual frame work of study

Conceptual frame work of study

Child aged 6 months to 59 months being enrolled at Nutrition clinic

Exclusion criteria applied – Co-morbidities that in themselves affect outcome of malnutrition management, care giver without telephone contact, lack of consent

SAM, WHO criteria – WHZ < - 3 SD, or MUAC < 11.5 cm, Telephone access, Consent

Child with SAM meeting inclusion criteria enrolled into study. N=161

Two weekly follow up and evaluation of outcomes in the first 28 days at OTP clinic

Care giver house wife, adequate knowledge on IYCN, use of routine antibiotics, vitamin A supplementation, measles vaccination/ updating on vaccination

Level of education, presence of other younger sibling, opportunity cost, longer distances to clinic

Occurrence of acute febrile illness or diarrhea, anemia, socioeconomic status

Recovered from SAM WHZ > - 3 SD, or MUAC > 11.5cm

Defaulter

Admission in to inpatient care

Death

3.0. JUSTIFICATION AND UTILITY OF STUDY

Kwale County has continued to record a high prevalence of severe acute malnutrition. A nutritional survey by the Ministry of Health in 2012 indicated a higher prevalence of severe wasting of 2.7% compared to the Kenya national prevalence of 0.8% in the 2014 demographic and health survey (8)(9). The concept of Therapeutic Feeding Centers through Family Life Training Centers, a project of the Ministry of Social Services was abolished in the end of 20th century majorly due to funding. Currently cases of non-complicated severe acute malnutrition are managed at OTP centres within the major hospitals in the county. (28) This has impacted negatively on coverage of treatment services for severe acute malnutrition management. Moreover, there lacks rigorous follow up once children are enrolled into OTP to ensure adequate coverage. (29)

In 2017, the estimated caseload report by the Ministry of Health in the month of February showed that 829 children in Kwale County aged 6 months to 59 months needed treatment for acute malnutrition, standing at 8.69% of all children with malnutrition. (18) The average booking in at the nutrition clinics for severe acute malnutrition per month recorded in the year 2017 were Kinango 6, Kwale 6, and Msambweni 29 making a total of 41 admissions per month in the three main hospitals in the County. (29)

There are no local studies in Kwale County on outcomes of severely acute malnourished children being managed at the outpatient therapeutics program.

This study will evaluate outcomes of nutritional rehabilitation at the nutrition clinics and assess for associated modifiable factors that can be target of future interventions to improve outcomes of children with severe acute malnutrition.

The research findings will influence the approach of the medical community, other stake holders as well as the County government towards outpatient management of malnutrition and further inform policy with the aim of improving outcomes towards achieving sustainable development goals.

3.1.   Research Question
- What are the short-term outcomes of children aged 6 to 59 months with severe acute malnutrition managed in outpatient therapeutic program (OTP) in Kwale County, Kenya

4.0   OBJECTIVES

4.1.   Primary objective

- To estimate the proportion of children managed for severe acute malnutrition within OTP centres in Kwale county who achieve WHZ above – 3 SD within the first 28 days of follow up

4.2.   Secondary objectives

- To evaluate the mean weight gain (in g/kg/day) and mean change in mid upper arm circumference (MUAC) of children with severe acute malnutrition on follow up at OTP centres within the first 28 days
- To determine the proportion of children with severe acute malnutrition on follow up at OTP centres who are admitted for inpatient care, default from follow up, or die within the first 28 days of follow up

5.0. METHODOLOGY
5.1 Study Design
The study was a prospective longitudinal study. (30) The study participants were enrolled as they were being booked in at the nutrition clinic and followed up 2 weekly in the first 28 days. A prospective study enabled a view of changes over time giving room to explore variables affecting these changes in a clear focus and with validity.

5.2 Study site
The study was conducted at the outpatient nutrition clinics in the three main hospitals in Kwale County, namely Kwale Sub County, Kinango Sub County, and Msambweni County Referral Hospitals.

Kwale County has a geographical area of 8,270 km sq, with an estimated population density of 86.3 persons per square kilometer. The population of children under 5 years is estimated to be 115,589 comprising 16.2% of general population. (29) The hospitals serve the three districts of Kwale County namely Kwale, Kinango and Msambweni districts, as well as some referrals from Tanzania villages and towns across the Kenya – Tanzania border.

The number of children booked into nutrition clinics for management of non-complicated severe acute malnutrition per month is estimated to be 29 at Msambweni County Referral Hospital, 6 at Kinango Sub County Hospital, and 6 at Kwale Sub County Hospital, and these serve as the focal points for nutrition care in the county. (29)

A child can be referred to the OTP when found to be malnourished during routine well baby clinic attendance, from the under-five outpatient clinics for the sick child, as well as upon discharge from the ward after management of an acute illness. These children with non-complicated severe acute malnutrition are sent to a nutrition clinic near their area of residence within the County. Personnel that attend to patients at OTP centers comprise of nutritionists, nurses and Community Health volunteers who are responsible for monitoring nutritional anthropometric measurements, offering nutritional counseling, dispensing RUTF and nutritional follow-up. The Kenya IMAM guidelines of 2008 is the main reference of care utilized at the OTP. (17)

5.3 Study Population
The study participants were children aged 6 – 59 months being booked in to the nutrition clinic with features of severe acute malnutrition as per WHO parameters without complications.

5.3.1 Inclusion criteria
- All children booked into nutrition clinics with:
- Severe acute malnutrition based on WHO growth standards of WHZ less than –3 SD, or MUAC less than 11.5 cm,
- The care giver of the child enrolled had to sign a written informed consent.

5.3.2 Exclusion criteria

- Children who had co-morbidities that in themselves affect outcome of severe acute malnutrition management irrespective of optimum appropriate outpatient therapeutic nutritional care for severe acute malnutrition were excluded. These include conditions such as congenital heart disease, cerebral palsy with feeding difficulties, gastric surgery, confirmed gastroesophageal reflux disease (GERD) and any childhood malignancy.
- Children whose caregivers had no telephone contact
- Children whose caregivers declined to give a written informed consent.

5.4 Study period

The study was conducted over a period of five (5) months. The desired sample size had been achieved by consecutive sampling from enrolments from September 2018 to January 2019.

5.5 Case definitions

Severe acute malnutrition – presence of very low WHZ (less than – 3 SD), MUAC < 11.5 cm and/or presence of nutritional edema. (6)

Appetite – natural desire to satisfy a bodily need. In this context being feeding, which is assessed objectively by administration of the appetite test. Good appetite is defined as consumption of at least 75% of prescribed RUTF offered during appetite test sitting. (17)

Change in WHZ – either increase or decrease in weight for height/length index compared to that recorded at enrollment

Death – died during the 28 days of follow up

Admission – child hospitalized for inpatient care during the 28 days after of follow up

Defaulter – missing at the 2 - weekly clinic visits at OTP center in the 28 days of follow up and being confirmed that the patient is alive and not admitted into in patient.

5.6 Outcome measures

Primary outcome of interest:

- Proportion of children with WHZ score > – 3 SD or MUAC more than 11.5 cm at 28 days of follow up

Secondary outcomes of interest:

- Mean weight gain in g/kg/day of children within the 28days of follow up

- Proportion of children who were admitted, defaulted from follow up or die within the 28 days of follow up

Formulas applied:

$$Proportion\ of\ Defaulter = \frac{No.\ of\ defaulters}{total\ No.\ of\ children\ enrolled\ in\ to\ study}$$

$$Proportion\ that\ died = \frac{No.\ of\ children\ who\ died}{total\ No.\ of\ children\ enrolled\ in\ to\ study}$$

Figure 3: Weight gain grading during OTP follow up (Sphere) (17)

< 5 g/kg/d	Poor
5 – 10 g/kg/d	Moderate
>10 g/kg/d	Good

Figure 4: Case fatality rate grading during OTP follow up (17)

< 1%	Excellent
2 – 4%	Good
5 – 10%	Moderate
> 10%	Poor

5.7 Sample size calculation

Using statistical formula for calculating finite population less than 10,000, a sample size of 161 was targeted for inclusion into the study.

This was based on:

- an estimated number of 492 as the Caseloads of Children aged 6-59 Months requiring outpatient treatment for Severe Acute Malnutrition in Kwale County as reported in Ministry of Health Nutrition Situation Report in 2018;
- a recovery rate of 80.7% of severely acute malnourished children on OTP follow up as reported in Kenya IMAM evaluation report by UNICEF (20);
- a standard normal value corresponding to 95 % confidence interval (1.96) and an absolute error between estimated and true value of 5 % (0.05).

N = 492, p = 0.807, d = 0.05, Z = 1.96, n = 161

$$n = \frac{NZ^2 pq}{d^2(N-1) + Z^2 pq}$$

5.8 Data collection instruments

To enable collection of data to meet the research objectives, the main data collection instrument was a questionnaire.

A semi structured questionnaire was developed for the study. The information captured in the questionnaire included bio data, medical history, physical examination findings including anthropometry, dietary information, as well as relevant demographic and socio-economic history. Pretesting of the questionnaire was done at Mbagathi District Hospital to check on applicability, reliability and validity in capturing pertinent information to meet the study objectives before launching it into the study.

A check list of record entries was modified from that for children on follow up at outpatient therapeutic program adopted from the Kenya Ministry of Health IMAM guidelines of 2008. (17)

5.9 Study Procedures

5.9.1   Sampling procedure

Consecutive sampling of participating children was done until the desired sample size was reached. This was proportionately balanced factoring in contribution from the three (3) study sites balanced according to their average enrollment in the year 2017.

At booking in at the nutrition clinic, the child was evaluated for severe acute malnutrition as per the WHO standards. (4) The nutritional parameters were measured afresh to confirm the inclusion criteria, and recorded as baseline data.

The study was explained, and consent for inclusion into the study was sought from the care givers, then information on telephone contact and return date was recorded. Participants were given a serial number as their reference code to be used all through the study. The investigator did not interfere with the hospitals usual discharge and follow up procedures at the OTP centers.

Research assistants who have basic biostatistics background were trained on data collection procedures and tools of the study before commencement of the actual study, and also appraised on objectives of the study. Outpatient therapeutic program centers and nutrition clinics that were the centers for follow up of an enrolled participant were visited within a week of the child's enrollment to ascertain availability and serviceability of a digital medical weighing scale and a height measuring board or supply them with one.

5.9.2   Evaluation at enrollment

The principal investigator and or a research assistant evaluated every child at booking in to determine if they met the inclusion criteria before enrollment in to the study. Informed written consent was obtained, thereafter a questionnaire was administered to the care giver. The questionnaire extracted information on the child's demographics, medical history and care giver characteristics. A clinical evaluation of the child was performed including anthropometric measurements (weight, height, mid upper arm circumference), assessment of nutritional oedema, pallor and dehydration, and an appetite test administered. (Appendix 9) Findings were recorded as baseline parameters for the enrolled participant. All children had WHZ score below – 3 SD, while age, residence, level of education of caregivers, economic status of caregivers, timing of starting complementary feeding and other feeding practices differed.

5.9.3   Evaluation at two (2) weekly follow up visits

At two weekly intervals after discharge, the principal investigator and or a research assistant reviewed the child at the OTP center of follow up. Evaluation of outcome measures was done. This comprised assessment of the child's general condition, measurement of weight, height/length, MUAC, and appetite test was administered. The care giver was interviewed based on the follow up questionnaire to determine if the child had any fever, cough or diarrhea or if the child was admitted for inpatient care in the preceding two weeks and responses recorded.

At the end of each clinic day, a phone call was made to care takers of children who failed to attend clinic as scheduled to find out if the child was admitted for inpatient care, had defaulted for other reasons, or had died. Phone call interview was attempted four times in a span of 24 hours from the day of missed clinic. A defaulter was a child who was reported to be alive and had not been admitted into inpatient care but had missed the 2 weekly clinic visits at the OTP clinic during the study period even if the phone call made was responded to. Appropriate health information was passed to the care giver regarding danger of missing clinic.

6.0. QUESTIONNAIRE

A questionnaire was administered by the primary investigator and/or research assistant to the care takers of the participating children. The questionnaire was semi structured and contained instructions on how to fill the different sections. All entries regarding the research findings were documented within the questionnaire.

6.1. Anthropometry measurements

Weight: Weight of the child was recorded as an average of three measurements taken on a calibrated digital medical weighing scale with minimal clothes and without shoes. The weighing scale used was recalibrated to zero before taking each weight with three weight measurements taken then average rounded off to the nearest 100 grams was recorded.

Height/length: This was taken using a height measuring board. The child was without shoes and held such that the feet were flat on the bottom surface of the measuring board.

The heels, shoulders, buttocks and head were held firmly but gently parallel to the length of the board and with the help of an assistant, then measurement taken. Three readings taken were averaged to be the height of the child and recorded to the nearest 0.1cm. (17)

A child greater than 87cm generally could stand with/without support hence a height reading was taken, while a child less than 87 cm was made to lie on the measuring board and a length taken. (31)

WHZ scores: Weight for height/length indices were computed using the WHO growth charts to get the Z scores. (3)

Mid upper arm circumference (MUAC): MUAC was taken at a midpoint from the olecranon of the left elbow with the elbow flexed to 90 degrees, to the tip of the shoulder of the left arm. Any clothing on the arm was removed, then using a MUAC tape encircling this midpoint, the reading was made to the nearest 0.1 cm. (17) An average of three readings taken was recorded as the MUAC for the child.

6.2. Clinical examination as evaluation of outcomes

The following examination was done in a quiet room at the study site and findings documented; general clinical condition, pallor, oedema, dehydration, appetite, open skin lesions, and milestones.

The presence or absence of oedema was determined by pressing the feet and/or hands of the patient with the examiners thumbs for 5 seconds and releasing after which the foot and/or hand was observed and felt for any indentation. (32) If present, the extent was determined by checking for oedema in both legs/hands and graded accordingly. Mild edema is oedema on hands or feet only, moderate oedema is oedema reaching the elbows or knees, while severe oedema is generalized oedema. (31)

Appetite test: An appetite test was administered by the principal investigator and or research assistant. It is an important indicator of clinical situation of a child with malnutrition. (33) A child was offered RUTF portion in a quiet room with the help of the care giver, while encouraging the child to feed, as well as offer water to drink, in a test duration of 30 minutes. The portion of RUTF offered was calculated based on the child's weight, and a child who consumed at least 75% of the RUTF for the weight scored a 'pass' and indicated good appetite. (Appendix 9)

Figure 5: Flow chart of study procedure

All children aged 6 months to 59 months being enrolled in to nutrition clinic

Assessment of nutritional status by WHO criteria;

WHZ < - 3 SD, or MUAC < 11.5 cm

Inclusion criteria applied

Exclusion criteria applied –

Co-morbidities that in themselves affect outcome of malnutrition management, care giver without telephone contact, lack of consent

Children with Severe Acute Malnutrition enrolled into study;

T 0 – baseline anthropometry recorded

Children lost to follow up; allowable 10%

Children participating in study, n = 161

Evaluation of outcomes in the first 28 days of follow up at OTP clinic;

Clinical assessment, weight, height, MUAC, oedema, appetite test

Evaluation at 14 days of follow up

T1 – first evaluation

Evaluation at 28 days of follow up

T2 – final evaluation

6.3. Data management and analysis

Data was entered into MS excel, cross checked for completeness, consistency and accuracy by review of entries made in questionnaires by primary investigator before analysis. Then data was entered into Epi data version 3.1 for analysis.

Coding of data was done for ease of manipulation, analysis and presentation.

Data tables and graphs were used to present frequency distribution for dependent and independent variables.

Descriptive analysis for participants baseline characteristics such as age were computed statistically using means or medians. Categorical data such as WHZ score were reported using frequencies and proportions.

For categorical variables Chi-square test ($p<0.05$) and odds ratio with corresponding 95% confidence interval were used to determine presence of associations between dependent and independent variables.

A calculated probability (p-value) of 0.05 or less was defined as statistically significant with reference to mean weight, height, and weight for height Z-score.

Paired t test (0.05) was used to compare differences for paired continuous variables, mainly to compare differences in anthropometric values at onset and after the 28 days of follow up.

Outcomes of the patients at the end of 28 days was assessed by determining weight for height Z score achieved, rate of weight gain, admission into inpatient care, defaulters and deaths during the period of follow up. Multivariate analysis using log regression was used to evaluate associations between the participants variables at baseline and across the study, and outcome variables while controlling for other related factors.

6.4. Ethical considerations

Approval for the study was from the Department of Paediatrics and Child Health University of Nairobi, Kenyatta National Hospital ethics and research committee, the office of County Executive Committee for Health, Kwale County and individual Hospitals' administration. Enrolment in to the study was on voluntary bases, a written informed consent was sought from individual child's care giver, and participants had free will to step out of the study and were not be subject to intimidation in so doing.

All data entries were entered using serial numbers and not patients name or any personal identifiable information in order to maintain confidentiality. Electronic data was secured by password-only access files and folders, while any written data was stored under lock and key.

No harm or risk was done to participants or their care givers at any one time in the study. Moreover, children identified to have danger signs and medical complications were reviewed by the primary investigator and referred for appropriate medical care.

In return each care giver was counseled on importance of good nutrition on children's wellbeing, advised on benefit of follow up at the nutrition clinic, and allowed to make enquiries about their child from the primary investigator as a Paediatrician.

6.5. Dissemination strategy
The findings from this study will be presented to the Department of Paediatrics and Child Health, University of Nairobi School of Medicine as a dissertation and published in the Universities online repository. It will as well be submitted for publication in journals, presented in conferences and workshops, and findings will be availed to relevant stakeholders in the area of paediatrics and malnutrition. Additionally, this study may be used as a reference point for further studies in this area.

Feedback on study findings will be shared with the participating nutrition clinics and hospital authorities at Kwale Sub County hospital, Kinango Sub County hospital and Msambweni County referral hospital, and recommendations will be made where applicable.

7.0 RESEARCH FINDINGS

In this chapter, results and analysis of the study findings will be demonstrated. This will highlight findings describing the study variables, changes in anthropometric measurement between enrollment and at 28 days of follow up or at discharge from the nutrition clinic, and significant factors associated with these changes. The outcomes of this study were recovery, failure, weight gain, defaulter, transferred, admissions and death. These results are presented in charts, tables and graphs.

7.1 Characteristics of study participants

Children aged between 6 months to 59 months were enrolled into the study comprising a sample size of 161. Kwale nutrition clinic contributed 24 (14.91%) of study sample, Kinango 22 (13.66%) and Msambweni clinic 115 (71.43%). Taken in total, 72 (44.72%) were male while 89 (55.28%) were female with a median age of 13.5 months.

On general overview of the medical status, about 36 (22.36%) of the children enrolled had been admitted earlier than two (2) weeks before joining the study while only 19 (11.80%) of children enrolled had suffered a chronic disease in their life. All children enrolled had their vaccination status up to date as per Kenya Expanded Programme on Immunization (KEPI) guidelines at the time of the study.

Majority of caregivers were mothers constituting 137 (85.09%) with 127 (78.88%) of them being married. Twenty-one (13.04%) of caregivers had no formal education, 69 (42.86%) had primary education, while as much as 84 (52.17%) being unemployed. The main income generator was the father representing 117 (72.67%) of the sample studied, with 40 (24.84%) reported to earn above Kshs 15,000.

Slightly over half of the respondents, 83 (51.55%) were living in mud houses, with only 31 (19.25%) of households having access to piped water regularly. At least 121 (75.16%) households use pit latrines, with 12 (7.45%) having to use the bush for excreta disposal. The average household regular occupancy was 5.25, while 12 (7.45%) households had at least three (3) children under the age of 5 years.

Table 4: Baseline characteristics of children enrolled into study

Children enrolled	N =161	%
Clinic samples		
Kwale clinic	24	14.91
Kinango clinic	22	13.66
Msambweni clinic	115	71.43
Age in months		
06 – 12	77	47.83
13 – 18	48	29.81
19 – 24	26	16.15
25 – 59	10	6.21
Gender		
Male	72	44.72
Female	89	55.28
Birth order		
First	54	33.54
Second	35	21.74
Third	39	24.22
Forth	19	11.80
Beyond forth	14	8.69
Prior admission		
Admitted	36	22.36
Never admitted	125	77.65
Chronic illness		
Tuberculosis	9	5.59
HIV/AIDS	10	6.21
None	142	88.26
Vaccination (KEPI)		
UpToDate	161	100
Not UpToDate	0	0
Caregiver relation		
Mother	137	85.09
Father	18	11.18
Other	6	3.73
Caregiver formal education		
None	21	13.04
Primary education	69	42.86
Secondary education	66	40.99
Tertiary	5	3.11
Caregiver occupation		
Regular employment	13	8.07
Casual employment	64	39.75
Not employed	84	52.17
Income earned (per month) Kshs		
15,000 and above	40	24.84
10,000 – 15,000	26	16.15
5,000 – 10,000	24	14.91
Below 5,000	26	16.15
Not known	45	27.95
House occupant(s) under 5 years old		
1	67	41.61
2	82	50.93
3 and above	12	7.45

7.2 Infant and young child nutrition practices

On review of knowledge on socio-cultural factors affecting infant and young child feeding practices it was found that 141 (87.58%) of respondents were aware that a child should start complementary feeding at 6 months of age. The most popular complementary food was porridge made of maize flour 160 (99.38%) though other combinations were used as complementary foods. Mashed foods comprising of raw bananas, potatoes and tomatoes. Majority of the respondents 104 (64.60%) indicated that a child should be fed three (3) meals in a day to start off complementary feeding, with most children 138 (85.71%) being fed at random times when the child demands, and about 87 (54.04%) children will be allowed to share food from the same plate with other family members.

All children in the study had been breastfed. Over half of them (60.25%) were exclusively breastfed until 6 months of age while 56 (34.78%) were started on complementary foods before 6 months of age. With reference to 24 months as the cut off age for appropriate stopping of breastfeeding, breastfeeding status of 31 (19.25%) children was inappropriate.

On 24 hour feeding recall, 116 (72.05%) children had received at least three (3) meals and above with the most popular food type comprising of cereals and grains at 99.38%. At most 74.53% of the children received vegetables, a significant number of children (63.98%) were fed on sugary foods such as biscuits, while less than half of the children (42.24%) were fed on meat or fleshy protein such as fish.

Table 5: Infant and young child feeding among care giver of children enrolled into study

Sociocultural factors on Infant and Young Child Nutrition (IYCN)	N =161	%
Knowledge on age for initiation of complementary foods (months)		
4	6	3.73
5	13	8.07
6	141	87.58
7	1	0.62
Knowledge on number of meals in a day for complementary feeding		
1	13	8.07
2	34	21.12
3	104	64.60
4 and above	10	6.21
Knowledge on specific timings of feeding		
Yes	23	14.29
No	138	85.71
Practice of sharing food on same plate		
Yes	87	54.04
No	74	45.96
Breastfeeding practice		
Ever breastfed	161	100

Practice on duration of exclusive breastfeeding		
Less than 6 months	56	34.78
At 6 months	97	60.25
More than 6 months	8	4.97
Practice on current breastfeeding status		
Appropriate	130	80.75
Not appropriate	31	19.25
Number of meals given yesterday		
1	13	8.07
2	32	19.88
3	103	63.98
4 and above	13	8.07

Knowledge of foods used upon initiation of complementary feeding (%)

- Uji: 99.38
- Milk: 36.65
- Mashed foods: 29.19
- Tea: 8.7
- Whatever available: 0.62
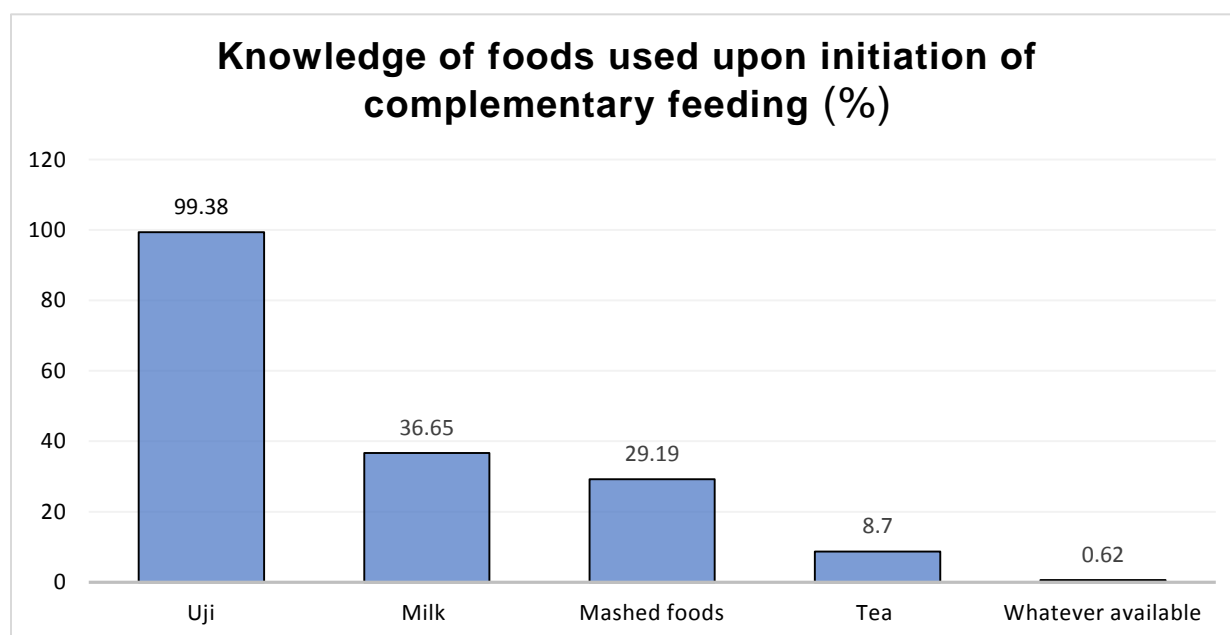
Figure 6: Graph showing knowledge of types of food introduced to children at initiation of complementary feeding

7.3 Medical status across of the children enrolled during the study period

Several medications were issued to the children in different combinations. Some were given medications as routine at OTP while others were given when the child fell ill as per clinician's discretion.

In this study, only 111 (68.94%) of the children enrolled received amoxicillin, while only 114 (73.55%) received vitamin A yet these are to be given routinely to all children at OTP. Other therapeutics dispensed were Septrin 27 times, albendazole 48 times, and multivitamin 16 times.

Table 6: Medications dispensed to children enrolled into study during study period

Medication use during the study period	N=161	%
Antibiotics given		
Amoxicillin	111	68.94
Septrin	27	16.77
None	23	14.29
Vitamin A supplement		
Yes	114	73.55
No	41	26.45

7.4 Clinical status across the duration of study

On enquiry about illness within 2 weeks prior to enrollment and subsequent visits during the study period, 55 (34.16%) children were reported as having fallen ill prior to enrolment, 26 (24.07%) were reported to have fallen ill prior to the first review at week 2, while 6 (10.34%) were reported to have fallen ill prior to the second review at week 4. Different combinations of illness were reported and recorded including cough, fever, diarrhea and vomiting; and generally showed a reducing trend of morbidity with subsequent visits. Children who had regressed milestones at enrolment recovered fully across the study period, while proportion of children with delayed milestones did not have significant improvement in the four (4) weeks of nutritional rehabilitation.

8.0 ASSESSMENT OF OUTCOMES

8.1 Transition of patients through the four (4) weeks of follow up

A total of 161 children were enrolled into the study and their baseline characteristics described. Follow up was done at the nutrition clinic with reviews at 2 weeks and at 4 weeks.
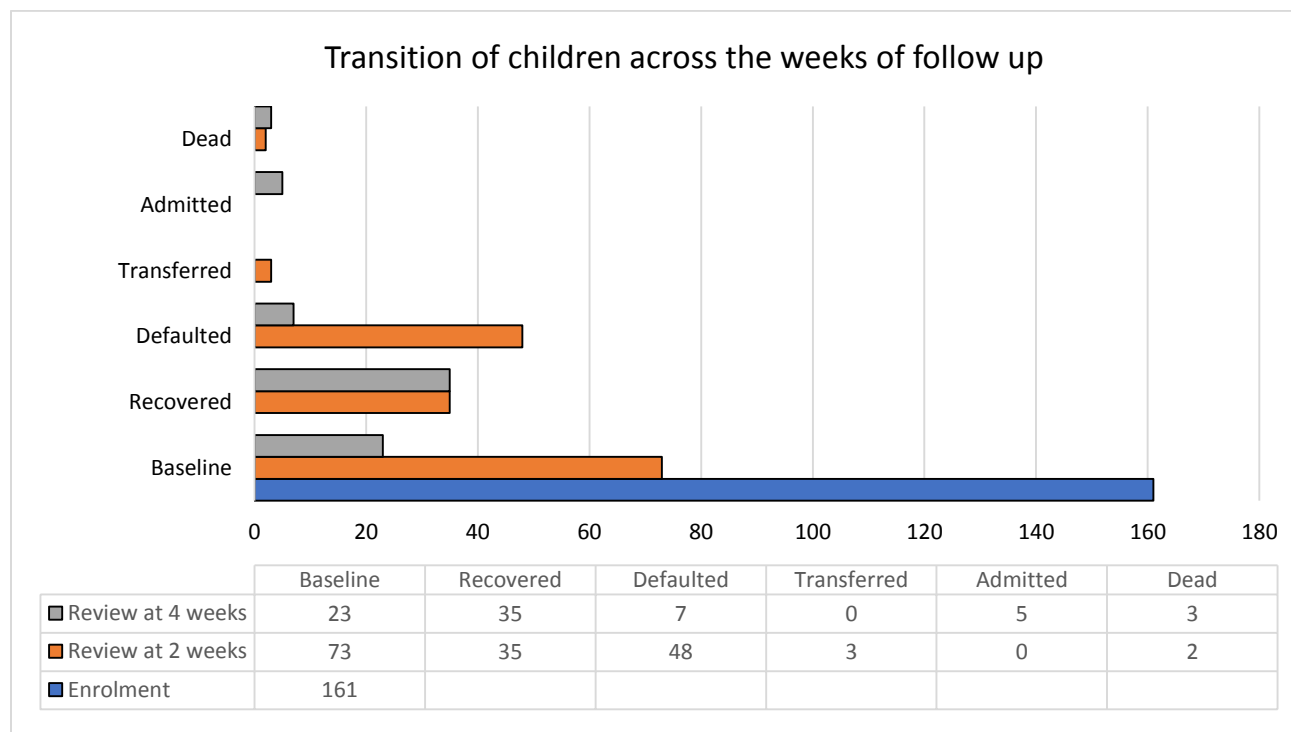
Figure 7: Bar graph representing tally of children at 2 weeks and 4 weeks review

8.2 Objective 1: Clinical outcomes in the four (4) weeks of follow up

The outcomes of severe wasting of the children aged 6 – 59 months enrolled into the study are tabulated below. Of the 161 children enrolled, 70 (43.48%) recovered, 23 (14.29%) failed treatment, 55 (34.16%) defaulted from follow up, 5 (3.11%) were admitted, 5 (3.11%) died and 3 (1.86%) were transferred.

Table 7: Clinical outcomes of children followed up over the 28 days of study

Outcome	N = 161	% outcome	Sphere standards reference (%)
Recovered	70	43.48	75
Fail	23	14.29	25
Default	55	34.16	15
Admitted	5	3.11	-
Dead	5	3.11	10
Transferred	3	1.86	-

8.3 Proportion of children achieving WHZ above – 3 SD (recovered)

Overall, 43.48% of the children enrolled in to the study recovered, with their WHZ improving to more than – 3 SD. At 2 weeks of follow up, 23.60% (38/161) had recovered, while 43.84% (32/73) recovered as at 4 weeks of nutritional rehabilitation.

Using bivariate analysis, factors significantly associated with recovery were a distance less than 10 km from clinic, not having diarrhea, a child whose breastfeeding status is appropriate, uptake of RUTF reported by the caregiver as good, administration of Vitamin A, and administration of amoxicillin. Children living less than 10 km from clinic had 75% higher likelihood of recovery (OR 0.25, 95% CI 0.12 – 0.5). An average distance of 10km falls within 60 minutes travel time by popular modes of transport in the community studied, and such time has been related to morbidity and mortality risk in healthcare access. Appropriate breast-feeding status had four (4) times higher likelihood of recovery (OR 4.0 95% CI 1.55 – 10.5). Children who had RUTF uptake described as 'good' by the caregiver had seven (7) times higher chance to recover than those described as moderate (OR 7.1 95% CI 1.4 – 35.7). Children who received vitamin A had six (6) times higher chance of recovery (OR 6 95% CI 2.46 – 14.66), while children who received amoxicillin had twenty (24) times higher likelihood to recover compared to those who did not receive amoxicillin (OR 23.9 95% CI 6.99 – 81.42).

Table 8: Significant factors associated with recovery

Variable	Recovered	%Recovered	OR (95% CI)	p value
Distance Less than 10 km Above 10 km	56/101 14/60	55.423.3	**0.25(0.12-0.5)**	**<0.0001**
Diarrhea No Yes	63/131 7/30	48.1 23.3	**0.33(0.13-0.82)**	0.017
Breastfeeding status Appropriate Not appropriate	64/130 6/31	49.2 19.4	**4.0(1.55-10.5)**	0.004
RUTF uptake Good Moderate	17/19 18/33	89.5 54.5	**7.1(1.4-35.7)**	0.018
Vitamin A Given Not given	63/114 7/41	55.3 17.1	**6(2.46-14.66)**	**<0.0001**
Amoxicillin Given Not given	67/111 3/50	60.4 6.0	**23.9(6.99-81.42)**	**<0.0001**

8.4 Proportion of children who defaulted

The study recorded 34.16% default rate. Majority of the defaulters were in the first 2 weeks, with 29.81% of those enrolled defaulting, which is three (3) times more compared to defaulter rates at 4 weeks, at 9.85%. Factors associated with defaulting were distance above 10 km from the clinic, starting complementary feeding before 6 months of age, and inappropriate breastfeeding practice. Children residing more than 10 km from clinic have six (6) times likelihood to default (OR 6.5 95% CI 3.16 – 13.28). The age at which complementary feeding is started is strongly related to infant and young child nutrition practices, such that children started complementary feeds before 6 months of age have a higher chance to default than those started correctly at 6 months of age (OR 2.6 95% CI 1.28 – 5.35). Children not appropriately breastfed as a nutrition practice had 66% likelihood to default compared to those appropriately breastfed (OR 0.34 95% CI 0.15 – 0.76). This again signifies effect of improper infant and young child nutrition practices. Socio economic factors such as level of education, employment status and income of caregiver did not influence possibility of a child defaulting from follow up.

Table 9: Factors associated with defaulting

Variable	Defaulted	% Defaulted	OR (CI)	p value
Distance Less than 10 km More than 10 km	19/101 36/60	18.8 60.0	6.5(3.16 – 13.28)	<0.0001
Age at starting complementary feeding At 6 months Before 6 months	41/97 14/64	42.3 21.9	2.6(1.28 – 5.35)	0.008
Breastfeeding status Appropriate Not appropriate	38/130 17/31	29.2 54.8	0.34(0.15 – 0.76)	0.007

8.5 Description of rate of weight gain (g/kg/day)

This study recorded an average rate of weight gain of 5.80 g/kg/day. Only 30 out of 108 children who returned for continued follow up at the OTP achieved the acceptable rate of weight gain of at least 8 g/kg/day representing 27.78%, while 72.22% didn't reach the acceptable rate of weight gain.

Table 10: Clusters of rates of weight gain achieved with reference to Sphere standards

Rate of weight gain (g/kg/day)	Sphere standards classification	N =108	%
Below 5	Poor	50	46.30
5 – 10	Moderate	42	38.89
Above 10	Good	16	14.81

Children who had weight gain of at least 8 g/kg/day had good outcomes with 76.67% recovering by week two (2) of review, with an overall recovery of 96.67% in the four (4) weeks of follow up. Kwale clinic contributed 4, Kinango clinic 5 and Msambweni clinic 21 children who had the acceptable rate of weight gain, representing 18.18%, 20.83% and 18.26% of their respective bulk of children enrolled into the study.

Factors that were significantly associated with rate of weight gain of greater or equal to 8 g/kg/day were a child having age 12 months and below at enrolment, initiation of complementary feeding at 6 months of age and receiving Amoxicillin during the nutritional rehabilitation at OTP. Children aged 12 months and below had three (3) times higher likelihood to achieve the desirable average rate of weight gain (OR 3.35 95% CI 1.36 – 8.27). Administration of amoxicillin had eight (8) times higher likelihood of achieving the desirable rate of weight gain of 8 g/kg/day unlike when not administered (OR 8.08 95% CI 1.03 – 63.70), while initiation of complementary feeding at 6 months of age had 64% higher chance of achieving the desired rate of weight gain compared to children inappropriately initiated complementary foods before age 6 months (OR 0.36 95% CI 0.15 – 0.86).

Table 11: Bivariate analysis of factors significantly associated with achieving rate of weight gain of 8 g/kg/day and above

Variable	Children who gained weight 8 g/kg/day	% rate of 8 g/kg/day	OR (95% CI)	p value
Age 12 months and below Above 12 months	21/53 9/55	39.6 16.4	**3.35(1.36-8.27)**	**0.007**
Age at initiation of complementary foods Below 6 months At 6 months	19/49 11/59	38.8 18.6	**0.36(0.15-0.86)**	**0.02**
Amoxicillin administered Yes No	29/90 1/18	32.2 5.6	**8.08(1.03-63.7)**	**0.02**
Distance Above 10 km Below 10 km	24/86 6/22	27.9 27.3	0.97(0.34-2.77)	0.95
Meals consumed in a day 3 and above Below 3	21/77 9/31	27.3 29.0	1.09(0.43-2.75)	0.85
Belief on sharing food Acceptable Not acceptable	18/62 12/46	29.0 26.1	1.16(0.49-2.73)	0.74

Illness during follow up				
Yes	4/31	12.9		
No	6/36	16.7	0.74(0.19-2.91)	0.67
Vitamin A administered				
Yes	24/81	29.6		
No	6/27	22.2	1.47(0.53-4.11)	0.46
Chronic disease				
Yes	2/12	16.7		
No	28/96	29.2	0.49(0.10-2.36)	0.36
Under-fives in house				
Less than 3	30/101	29.7		
Above 3	0/7	0	Undefined	undefined
RUTF uptake				
Good	0/19	0		
Poor	6/33	18.2	Undefined	undefined

8.6 Multivariate analysis of factors associated with failed treatment

Logistic regression analysis was performed to identify factors that were significantly associated with failed treatment while controlling for other associated factors. Factors that had strong association on bivariate analysis (p <0.05) were put together on multiple regression analysis.

Failure to administer antibiotics during the follow up, a child having an episode of diarrhea, and a child having an episode of vomiting were directly associated with fail, while belief that sharing of food is acceptable was inversely related to failed treatment. Distance of above 10 km from the clinic, age of the child, sex or age of the child, level of education, occupation or monthly income of the caregiver did not have significant influence on failing.

A child who was not given amoxicillin had nine (9) times higher risk of failed treatment (AOR 9.38, 95% CI 2.75 – 31.94) compared to a child who received amoxicillin during OTP. A child who had an episode of diarrhea at any point in the follow up had nine (9) times higher likelihood of failing (AOR 9.11, 95% CI 1.97 – 42.14) compared to a child who didn't have diarrhea. An episode of vomiting in a child on follow up led to fourteen (14) times higher risk of failing (AOR 14.23, 95% CI 1.13 – 180.49) than a child who didn't have vomiting. Belief that sharing food is acceptable leads to only 20% risk of failing (AOR 0.21, 95% CI 0.05 – 0.82), while distance above 10 km leads to only 36% higher risk of failing treatment (AOR 0.64, 95% CI 0.11 – 3.66) and this association was not significant. Those who were given Vitamin A had lower odds of failing compared to those who were not (AOR 0.15, 95% CI 0.04-0.60).

Table 12: Table showing factors associated with failing treatment

Associated Factor to Failing	Adjusted OR (95% CI)	P value
Antibiotic		
Not given	1.00	
Given	9.38(2.75 – 31.94)	0.0001
Diarrhea		
None	1.00	
Yes	9.11(1.97 – 42.14)	0.005
Vomiting		
None	1.00	
Yes	14.25(1.13 – 180.49)	0.040
Vitamin A given		
No	1.00	
Yes	0.15(0.04-0.60)	0.007
Belief on sharing food		
Not acceptable	1.00	
Acceptable to share	0.21(0.05 – 0.82)	0.025
Distance		
10 km and below	1.00	
Above 10km	0.64(0.11 – 3.66)	0.619

8.7 Multivariate analysis of factors associated with defaulting

On logistic regression analysis, factors that were significantly associated with defaulting were poor knowledge on infant and young child nutrition (IYCN) and distance above 10 km. Children who had been exclusively breastfed until age 6 months had four (4) times more likelihood to default (AOR 4.73 95% CI 1.71 – 13.08), while residing at a distance more than 10 km away from the clinic had nine (9) times more likelihood to default (AOR 9.20, 95% CI 3.19 – 26.58). Children who had received antibiotics also had a risk of defaulting, recorded as nine (9) times more likely to default (AOR 9.72, 95% CI 3.21 – 29.45). This may be attributed to caregiver's belief that being given antibiotics shall cure malnutrition in the children.

Table 13: Factors associated with defaulting

Associated Factor for defaulting	Adjusted OR (95% CI)	P value
Distance		
10km and below	1.00	
Above 10km	9.20(3.19 – 26.58)	0.0001
Exclusive breastfeeding		
6months	1.00	
Below 6months	4.73(1.71 – 13.08)	0.003
Antibiotic		
Not given	1.00	
Given	9.72(3.21 – 29.45)	0.0001

AOR – Adjusted Odds ratio; CI – Confidence Interval

8.8 Changes of MUAC across the study period

All children booked in to OTP and enrolled into the study were diagnosed as severely wasted by WHZ score. However, as an anthropometric measurement, MUAC was taken at baseline and on all subsequent visits.

A total of 64 (39.75%) of the children enrolled had a MUAC less than 11.5cm at enrolment, hand in hand with the WHZ of less than – 3 SD. Overall, 36 (56.25%) of these children defaulted, 5 (7.8%) died, 3 (4.69%) got admitted into in patient care, 1 (1.56%) got transferred, while 19 (29.69%) remained until the end of the 4 weeks of follow up. Of the 19 who stayed in the clinic for the 4 weeks, 11 (17.19%) achieved a MAUC of at least 11.5cm and above described as normal MUAC, while 8 (12.5%) had the MUAC remain less than 11.5cm. On deeper analysis, 17 (26.56%) had improving MUAC from that at enrolment, while 2 (3.13%) had their MUAC dropping below that at enrolment.

All children who died in this study had a MUAC below 11.5cm at enrolment. On in-depth analysis, the variables of associated characteristics and interventions, and analysis of outcomes in MUAC as well as overall progress at the OTP for those who died and the children who had their MUAC drop was not different compared to the rest of the children enrolled into this study.

9.0 DISCUSSION

This chapter discusses the results based on the study findings. These outcomes were proportion of children who recovered, rate of weight gain, proportion of children who defaulted and proportion of children who died.

Among the significant factors associated with recovery within four (4) weeks are appropriate breastfeeding practices which signifies good infant and young child nutrition (IYCN) practice. At a cut off of 24 months, a child below two years should be breastfeeding, while a child aged over two years should have stopped breastfeeding giving room for full home diets. Proper uptake of ready to use therapeutic food (RUTF) as reviewed by number of empty packets returned as well as described by the caregiver had a high probability of recovery. Routine administration of amoxicillin and vitamin A to the child attending nutrition management at the clinic was associated with good recovery unlike in those who didn't get these therapeutics.

A child taken ill with diarrhea or vomiting at any one time in the follow up had high chance of failing treatment. Cough and fever did not have a significant effect on recovery or failure. Distance above 10km from the clinic which translated to approximately one (1) hour travel time was significantly associated with defaulting from follow up, whereas distance did not influence recovery or failure.

On review of rate of weight gain, weight gain rate of 1.00 g/kg/day was strongly associated with admission to hospital or death, while a rate above 10 g/kg/day had 100% chance of recovery.

Over half (56.25%) of children with MUAC below 11.5cm at enrolment are recorded as defaulted. This puts a query of possibility that these children might have died but reported falsely as defaulted. In a study on default on CMAM in Nigeria, children who had a lower MUAC at enrolment had the highest rates of death within the first two (2) weeks of follow up. In this study, 5 children died, and all of them had a MUAC below 11.5cm at enrolment.

Some confidence intervals were wide implying that the sample was insufficient to test for the associations, hence larger studies are needed to confirm these associations.

9.1 Discussion on Outcomes

This study recorded a recovery rate of 43.48%. The recovery rate is below the recommended recovery rate of 75% for OTP programs as set within the Sphere standards. The low recovery rate recorded in this study can be attributed to the observation that certain aspects within the IMAM guidelines were not adhered to. Routine administration of amoxicillin was recorded at 60.4%, while vitamin A was dispensed to 55.3% of the children studied. Nalwa et al in a 4-week study on outcomes of nutritional rehabilitation at OTP in Mathare valley in Nairobi recorded recovery rate of 57.5% in 2010. Nalwa observed that caregivers took advantage of the RUTF which they used as a food supplement for the rest of their children back at home. Mbaya et al in a similar study recorded

recovery rate of 73.3% in Kitui in 2015 which recorded frequency of routine administration of vitamin A of 92.3%.

Moreover, poor infant and young child nutrition (IYCN) practices may also explain the low recovery rate reported in this study. Although this study has recorded that all children had been breastfed and 87% were exclusive breastfed for six (6) months, only 70.81% of children were getting the recommended minimum three (3) meals a day once complementary feeding was initiated. This was an improvement compared to the findings from nutritional survey by the Ministry of Health conducted in Kwale in 2012 which recorded that exclusive breastfeeding by age 6 months was 52.3%, and consumption of at least three (3) meals a day for 6-23 months old breastfed children was 43.8%. In a study by Nisha Malhotra et al in India in 2012 showed that infant and young child feeding practices are more often associated with absence of knowledge on nutrition than affordability of food. This finding was also demonstrated in this study where only 70.81% of caregivers had correct knowledge on giving at least three (3) meals per day as the recommended feeding frequency on initiation of complementary feeding.

There is a high proportion of defaulters, at 34.16% which is two (2) times above the acceptable default rate of 15% as per the Sphere standards. A UNICEF follow up study in 2010 had a nationwide average default rate of 13%. The study identified Kwale county as a vast county with poor access to OTP services where only 50% of the children who needed OTP services could access care. This could explain the high defaulter rates as children had to travel long distances to the clinics. Kinango, a district in Kwale county, which was among the sites for this study was reported in the same study to have had less than 20% coverage.

Distance of above 10km which correlates with one (1) hour travel time on locally available mode of transport to the clinic had as much as nine (9) times higher risk of default, yet catchment area for children in the nutrition program went to as far as 42 km. Msambweni clinic had a default rate of 44.35% with an average distance of 12.26 km. Kwale clinic had no defaulters, while Kinango clinic had 18.18% defaulters with average distances of 5.58 km and 9.86 km respectively. Anja Schoeps et al observed in a study in Burkina Faso with a median travel time of 60 minutes that mortality hazard increased by a factor of 1.12 for each additional hour travelled to assess health care services. Travel time and distance in the 39 villages studied were highly corelated.

A child taken ill with diarrhea or vomiting had as much as nine (9) to fourteen (14) times higher risk of failing than a child who didn't experience such episodes during follow up. Vomiting affects overall intake of food as well as RUTF issued at OTP, while diarrhea withers a child's macro and micro nutrients, as well as electrolytes due to malabsorption among other mechanisms.

This study has recorded a moderate average rate of weight gain of 5.8 g/kg/day in the four (4) weeks of follow up. Sphere standards classifies rate of weight gain of less than 5 g/kg/day as poor, 5 – 10 g.kg/day as moderate and above 10 g/kg/day as good, with a rate of 8 g/kg/day as a recommended average rate of weight gain at the OTP. Only 30 out of 108 children (27.78%) who

remained on follow up without defaulting achieved the recommended average rate of weight gain of 8 g/kg/day during the four (4) weeks of follow up at OTP in this study. The average weight gain recorded in this study may be attributed to failure to adhere to various aspects within the IMAM guidelines such as routine administration of amoxicillin. Moreover, initiation of complementary foods before age 6 months comes up as a contributing factor which is related to poor Infant and Young Child nutrition practices. This study identified that a child below age 12 months had a higher rate of weight gain, hence close monitoring of the child older than 12 months is paramount. Mbaya et al in a similar study in Kitui in 2015 recorded a rate of weight gain of 5.1 g/kg/ day which still falls below the acceptable recommended rate of 8 g/kg/day, and the study noted that initiating complementary feeding before age 6 months as well as presence of illnesses in the children contributed to the low rate recorded.

This study recorded a mortality rate of 3.11%. Although this may be seen as acceptable based on the Sphere standards, it is important to note there were many defaulters within this study and these children too could have died. Two out of the five (5) children who died were reported as dead by the first review at 2 weeks. Children who died had potential risks such as house hold occupancy of more than 3 persons, were visibly wasted at enrollment, RUTF uptake was moderate as reported by caregivers, and had a negative average rate of weight gain of – 0.13 g/kg/day in the four (4) weeks of follow up. All children who died had a MUAC of less than 11.5cm at enrolment and had fallen ill at a point during the follow up. The illnesses reported were at least two complaints among fever, cough and diarrhea in different combinations. None had received amoxicillin, four (4) out of the five (5) children had not been given any antibiotic while on follow up, while only one had received vitamin A. Nalwa et al in study of outcomes at OTP in Mathare valley in Nairobi in 2012 recorded death rate of 1.6%. The locality of the study site (Mathare valley) had a better health facility access for the sick child than in Kwale county due to shorter distances travelled to access care.

9.2 Conclusions
1. This study recorded a low recovery rate of 43.48%, with a high default rate at 34.16% in the four (4) weeks of follow up in relation to the recommended acceptable ratees by Sphere standards.

2. The average rate of weight gain recorded is 5.8 g/kg/day which is categorized as moderate as per Sphere standards. This falls below the recommended acceptable average rate of 8 g/kg/day as per Sphere standards.

3. The proportion of children who were admitted for inpatient care at 3.11% is similar to that of children who died.

4. Factors associated with poor outcomes included age above 12 months, initiation of complementary feeding before age 6 months, inappropriate breastfeeding status, distance more than 10 km, presence of diarrhea, poor uptake of ready to use therapeutic food (RUTF) lack of routine administration of amoxicillin and or vitamin A to the children at OTP.

9.3.   Recommendations

1. Modalities should be put in place to improve access to nutrition services and follow up for children with severe acute malnutrition and this may include use of community health volunteers (CHVs) as well outreach programs.

2. There is need for regular review of rate of weight gain during follow up to identify children with poor weight gain so as to optimize on their nutritional rehabilitation.

3. The health care workers at the nutrition clinic should be sensitized to adhere to all aspects of OTP management as stipulated in the Integrated Management of Acute Malnutrition (IMAM) guidelines including routine administration of amoxicillin and vitamin A.

4. More studies are required to evaluate implementation of IMAM guidelines in the nutrition clinics in Kwale county and shed light into overall quality of nutrition rehabilitation at the outpatient therapeutic program (OTP) centres. Other studies may be designed to analyze defaulting in the outpatient therapeutic program in the County.

9.4   Study Limitation

The study enrolled children whose caregivers had telephone contact which left out a reasonable number that still gets attended at the OTP centers and would have been good to evaluate their outcomes. This brings about a potential risk of lack of generalizability of the study results to the population.

In the follow up visit's assessments included assessing for anemia which is common in children with severe acute malnutrition and it can affect outcomes. This study relied up on the physical examination of pallor to assess for anemia and no blood tests such as hemoglobin level were done. Clinical assessment of anemia using tongue pallor was used which has most accurate evaluation for anemia during clinical examination as reported in a hospital based diagnostic accuracy study in India in 2007, though it cannot compare to a laboratory testing. (34)

This study evaluated outcomes at 28 days due to limitation in time. Four (4) weeks is identified as the minimum duration for clinic visits in the management of severe acute malnutrition in the outpatient setting with expected reasonable outcomes. However, it would have been better to have a follow up until 42 days (6 weeks) which is the optimum duration estimated for favorable outcome in severe acute malnutrition management in Outpatient Therapeutic Program as per Sphere standards. This may underestimate the true number of children who achieved recovery at the OTP centers.

Although RUTF was issued as part of the OTP care, the study relied on care givers' reports to assess how the child consumed the portion given. Some care givers brought back empty packets for counting as an indicator of their child having consumed the RUTF. This posed the risk of desirability bias based on caregivers reporting on what they know they should do and not necessarily on actual practice done.

Based on exclusion of children with co morbidities affecting malnutrition management, the study results will not be generalizable to this population of children who constitute a proportion of children with marked effect from severe acute malnutrition.

Some of the study outcomes such as defaulters, inpatient admission as well as deaths during the study period were dependent on caregiver's reports. This had the risk of information collection that cannot be verified, as well as possibility of a phone call going un answered hence not sure of what outcome to capture.

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Appendix 1: Informed Consent Form in English
INFORMED CONSENT FORM FOR PARENTS/GUARDIANS IN ENGLISH
Title of Study:
Short term outcomes of children aged 6 to 59 months with severe acute malnutrition managed in Outpatient Therapeutic Program (OTP) in Kwale County, Kenya
Research team:

Researcher	Institution	Contact
Dr. Muttah Juma	University of Nairobi	0722902701
Prof. Wafula Ezekiel	University of Nairobi	0722366077
Dr. Mutai Beatrice	University of Nairobi	0708552909

Introduction
You are cordially invited to participate in this medical research that will be carried out in Kwale County involving participating patients from Kwale Sub County, Kinango Sub County and Msambweni County referral hospitals.
Purpose
The study will be to evaluate the outcomes of outpatient management of severely malnourished children aged 6 – 59 months in Kwale County. The study will include children of age 6 months to 59 months who meet the WHO descriptions of severe acute malnutrition without complications and can be managed in the outpatient. You have been invited because your child qualifies to be recruited in this study. Approximately 162 children will be enrolled to participate in the study.
Procedure
Once you agree to participate in the study you will be required to give some information while in a private room. A questionnaire will be used and it shall collect information regarding socio-demographic, socio-economic and socio-cultural characteristics. Your child will undergo medical examination, professionally, to record weight, height/length measurement, left mid upper arm circumference, temperature, respiration, any skin lesions, hydration status and pallor. An appetite test will be conducted. Readings will be taken every two (2) weeks for two consecutive visits at the nutrition clinic. Filling of the questionnaire is expected to take approximately 20 – 40 minutes.
The study shall include making telephone calls to you. This will be done on the day of attending clinic or the next day when the child fails to attend. This will allow the researcher to capture information on how your child is fairing on even when the child was not able to attend clinic.

Risks
This study is not expected to have any risks, and minimal risk if any. There are no invasive procedures involved. Your time that you shall spend on responding to the questionnaire is very much appreciated and highly valued.
Benefits
On agreeing to participate in the study, there will not be any direct benefits for you as an individual participant. The information collected will help us understand gaps in outpatient therapeutic programs in Kwale County. This will go a long way to improve on service delivery to the population in the County as well as other clients enrolled into outpatient therapeutic programs elsewhere. You are at free will to consult regarding health of your child.
Reimbursement
There will be no cost or reimbursement for participating. You will be participating in the study at the time of your regular clinic visit.

Voluntary participation and withdrawal

Your participation into the study is entirely voluntary in order to add information into the medical world. However, you have the right to exit from participating at any time. There shall be no penalty or punishment on you or your child for withdrawing.

Confidentiality

This study will use serial numbers instead of participants' names on the questionnaires, on other data collected as well as during analysis and reporting of results. The questionnaires and all data including electronic material will be kept under key and lock whereby the researcher and supervisors will be the only people with authorized access.

Contact persons

You can contact the researchers and KNH/UoN ethics and research committee when you have inquiries or worries about the content of this study or your rights and privileges as a participant.

> **Principal Investigator**:
> Juma Muttah, University of Nairobi, School of Medicine – 0722902701
> **KNH/UoN-Ethics and Research Committee:**
> The Chairperson, KNH/UoN-ERC, P.O. BOX 20723, Tel: 020-2726300-9; Fax: 2725272;
> Email: uonknh_erc@uonbi.ac.ke.

Confirmation of consent

Are you ready to contribute to medical knowledge by taking part in this study?

Yes_____ No_____

If yes, please sign

Participant No._____   Signature: _____

Witness: _____   Signature:_____

Time_____   Date_____

Appendix 2: Informed Consent Form in Swahili
FOMU YA RUHUSA KWA WAZAZI/WALEZI KWA LUGHA YA KISWAHILI
Kichwa cha Utafiti:
Matokeo ya muda mfupi ya watoto wenye umri wa miezi 6 hadi 59 wenye utapiamlo mkali ulioweza kusimamiwa katika Mpango wa Matibabu wa kliniki (nje ya wadi) (OTP) katika Wilaya ya Kwale, Kenya
Wachunguzi:

Mtafiti	Taasisi	Mawasiliano
Dr. Muttah Juma	Chuo Kikuu cha Nairobi	0722902701
Prof. Wafula Ezekiel	Chuo Kikuu cha Nairobi	0722366077
Dr. Mutai Beatrice	Chuo Kikuu cha Nairobi	0708552909

Utangulizi
Umealikwa kikamilifu kushiriki katika utafiti huu wa kimatibabu ambao utafanyika katika Wilaya ya Kwale inayohusisha wagonjwa wanaoruhusika kutoka kwa wadi kutoka Kwale Sub County, Kinango Sub County na Hospitali ya Rufaa ya Wilaya, Msambweni County Referral.
Makusudio
Utafiti huu utakuwa wa kutathmini matokeo ya usimamizi wa wagonjwa wa nnje wenye utapiamlo mkali kwa watoto wenye umri wa miezi 6 hadi 59 katika Wilaya ya Kwale. Utafiti huu utajumuisha watoto wa miezi 6 hadi miezi 59 ambao wameafikia maelezo ya WHO kuhusu utapiamlo mkali bila matatizo na unaweza kusimamiwa kwa kliniki ya lishe. Umealikwa kwa sababu mtoto wako anaafikia mahitaji ya kujumuishwa katika utafiti huu. Takriban watoto 162 watajiunga kushiriki katika utafiti.
Utaratibu
Mara unapokubali kushiriki katika utafiti utahitajika kutoa habari ukiwa katika chumba cha faragha. Daftari dodoso itatumika na itakusanya taarifa kuhusu sifa za jamii, kijamii na kiuchumi na kijamii na utamaduni. Mtoto wako atafanyiwa uchunguzi wa matibabu, kitaaluma, kurekodi uzito, urefu, upana wa katikati ya mkono wa kushoto ,joto, kupumua, vidonda vya ngozi, hali ya maji mwilini, na hali ya kiwango cha damu. Kupima hamu ya chakula pia utafanyika. Vipimo vitachukuliwa kila baada ya wiki mbili (2) kwa ziara mbili za mfululizo kwenye kliniki ya lishe. Kujaza dodoso kunahitajika takribani dakika 20-40.
Utafiti huu utajumuisha kupiga simu kwako wewe msimizi wa mtoto. Hii itafanyika siku ya kuhudhuria kliniki au siku inayofuata wakati motto hakuweza kuhudhuria. Hii itawezesha mtafiti kukamata taarifa juu ya jinsi motto wako anaendelea hata wakati motto hakuweza kuhudhuria kliniki.
Hatari
Utafiti huu hautarajiwi kuwa na hatari yoyote, na ikiwepo basi ni hatari ndogo mno. Hakuna taratibu za uvamizi au kudunga sindano zitakazo husika. Wakati wako utakaotumia katika kujibu maswali katika utafiti huu unachukuliwa wa thamani sana na tunakushukuru.

Faida
Kwa kukubali kushiriki katika utafiti huu, hakutakuwa na faida yoyote ya moja kwa moja kwako au kwa motto kama mshiriki binafsi. Taarifa zinazokusanywa zitatusaidia kuelewa mapungufu katika mipango ya matibabu ya nnje ya wagonjwa wa utapiamlo katika Wilaya ya Kwale. Hii itaenda njia ndefu ya kuboresha utoaji wa huduma kwa wakaazi katika wilaya pamoja na wateja wengine waliojiunga na mipango ya matibabu ya nnje ya utapiamlo mahali pengine. Unaruhusiwa kuuliza ushauri kuhusu malezi ya kiafya ya mtoto wako.

Malipo

Hakutakuwa na gharama au malipo kwa kushiriki. Utakuwa ukishiriki katika utafiti wakati wa ziara yako ya kawaida ya kliniki ya lishe.

Ushiriki wa hiari na kujiondoa

Ushiriki wako katika utafiti ni kikamilifu kwa hiari ili kuongeza habari katika ulimwengu wa matibabu. Hata hivyo, unahaki ya kujiondoa kushiriki wakati wowote. Hakutakuwa na adhabu juu yako au motto wako kwa kujiondoa.

Usiri

Utafiti huu utatumia namba badala ya majina ya washiriki kwenye swali, kwa data nyingine zilizokusanywa pamoja na wakati wa uchambuzi na kunakili taarifa za matokeo. Maswali na data zote ikiwa ni pamoja na za elektroniki vitawekwa chini ya ufunguo na kufuli ambapo mtafiti na wasimamizi watakuwa watu pekee wenye mamlaka.

Watu wa mawasiliano

Unaweza kuwasiliana na watafiti na kamati ya KNH/UoN ya maadili na utafiti wakati una maswali au wasiwasi juu ya maudhui ya utafiti huu au haki zako kama mshiriki.

> **Mtafiti Mkuu:**
> Juma Muttah, Chuo Kikuu cha Nairobi, Shule ya Matibabu – 0722902701
> **Kamati ya KNH/UoN – Maadili na Utafiti:**
> Mwenyekiti, KNH/UoN – ERC, Sanduku la Posta 20723,Simu:020-2726300-9;Faksi:2725272;
> Barua pepe: uonknh_erc@uonbi.ac.ke.

Uthibitisho wa idhini

Je, ukotayari kuchangia ujuzi wa matibabu kwa kushiriki katika utafiti huu?

Ndio_____ La _____

Ikiwa *ndio*, tafadhali weka ishara

Nambari ya Ushiriki_____ Sahihi:_____

Shahidi:_____ Sahihi:_____

Saa/ wakati_____ Tarehe _____

Appendix 3: Questionnaire in English (administered by researcher)
RESEARCH QUESTION

SHORT TERM OUTCOMES OF CHILDREN AGED 6 TO 59 MONTHS WITH SEVERE
ACUTE MALNUTRITION MANAGED IN OUTPATIENT THERAPEUTIC PROGRAM
(OTP) IN KWALE COUNTY, KENYA

Instructions on Filling the Questionnaire

Semi structured questionnaire directed by the primary investigator or research assistant

Read each question in the questionnaire to the respondents and indicate in the space provided

Put a tick **[√]** to the response given for the closed ended questions and where views are required,
document the response. Please be brief and straight to the point.

Do not write the respondents name anywhere on this questionnaire.

Do anthropometric measurements and physical examination of the child in a private room.

PART ONE

DEMOGRAPHIC DATA

Demography of the patient

Study identification No.   _____

1. Age of patient (in months)   ____
2. Birth order_____
3. Gender: 1. Male _____ 2. Female ____
4. Residence (indicate Sub County, and village) _____
5. How long have you stayed in the residence mentioned? _____months/ _____ years

Demography of the respondent (the care giver)

6. Relationship with the patient-
a. Mother _ b. Father_____ c. Other _____ Specify relation _____

7. Age of the care giver? _ Years
8. Level of formal education of the care giver-
a. None ___b. Primary Incomplete_c. Primary Complete _____

d. Secondary Incomplete _ e. Secondary Complete _____ f. Tertiary ____

9. Marital status of care giver
a. Single __ b. Married ___ c. Monogamous _____ d. Polygamous _____ e. Widowed __
___f. Separated _____ g. Divorced _____

10. Occupation/source of income of the care giver
a. Regular employment _____ b. Casual employment _____

c. Not employed _____

SOCIO-ECONOMIC HISTORY

Socio economic evaluation of household

11. Who is the main income generator (mention title in family with relation to patient) -------
12. What is the estimate monthly income (Ksh)? _____
a. > 20,000 _____ b. 15,000 – 20,000 ___ c. 10,000 – 15,000 ___

d. 5,000 – 10,000 _ e. 3,000 – 5,000 _____ f. < 3,000 ___ g. Don't know _____

13. How many people live in the house on a regular basis? _____
14. How many household occupants are children under 5 years of age? __
15. What material is used to make the walls of the house?
    a. Not permanent (grass)
    b. Semi-permanent (mud/timber) _____
    c. Permanent (stone/brick) _____
16. How many rooms are there in the house? -----------------
17. What is the usual latrine service mode for the house hold?
a. Flush Toilet _____ b. Pit latrine _____ c. Bush _____ d. Other_____

18. What is the main source of water for the family
a. Piped water Communal _ b. Piped water to own house _

c. Shallow well/Dam_____ d. River/stream _____ e. Other _____

Socio cultural assessment

19. When should other food be introduced to a child? (age in months)
----

20. What complementary food should be used for a child? ---

----
21. How many times in a day should the child be fed these complementary meals you have
named above? ---------------------------------------

22. Are there specific times of the day that a child should eat specific foods?
Yes _____ No _____

If yes specify………………………………………………………………………

23. Are children allowed to share food from the same plate?

Yes _____ No _____

PAST MEDICAL HISTORY

24. Any prior admission in to hospital? Yes _____ No ___

If yes, how many times? _____

25. What was the reason for admission?
    a. Illness lasting less than 2 weeks _____
    b. Illness lasting more than 2 weeks ____(please specify) _____

Immunization status

Vaccine	0	1	2	3
26. BCG				
27. OPV O (Birth)				
28. Pentavalent (DPT/DTaP)				
29. Pneumococcal				
30. Rota virus vaccine				
31. Measles		6 mo		9 mo
32. Any Booster vaccinations (specify)				

33. Any history of chronic illness? Yes _____ No _____
    a. a.Tuberculosis _____   b.HIV/AIDS _____
    b. c.Other (specify) _____
34. How has the weight of the child been in the last 3 months? (check card if available)
    a. Gaining weight_____
    b. Losing weight _____
    c. No change   _____

PART TWO

DIET HISTORY

35. Has the child ever breast fed? Yes _____ No ___

If No, state reason ……………………………

If Yes,

36. Up to what age was the child exclusively breastfed?

Age < 6 Months __ b. Age of 6 months _____c. Age > 6 months _____

37. Is the child still breastfeeding? Yes _____ No _____ * appropriate, not appropriate
38. Have you introduced other food to this child? Yes _____ No _____

39. How many meals in a day do you feed your child?
   a. One __ b. Two _____ c. Three_____ d. More than three __
40. How many meals did the child feed yesterday?
   a. One __ b. Two _____ c. Three_____ d. More than three __
41. List the foods given in the past 24 hours
   Porridge, ugali, bread, rice, or other foods made from grains a. Yes __ b. No _
   White potatoes, yams, cassava, or any foods made from roots a. Yes _ b. No _

   Pumpkin, carrots, or sweet potatoes a. Yes __ b. No _____

   Any dark green leafy vegetables a. Yes _____ b. No _____

   Ripe mangoes, ripe pawpaw, yellow fruits a. Yes ____ b. No _____

   Any other fruits or vegetables a. Yes _____ b. No _____

   Any meat, liver, kidney, heart, fish, or eggs   a. Yes _____ b. No _____

   Cheese, yogurt, or other milk products a. Yes _ b. No _____

   Any foods made from beans, peas, lentils, nuts, or seeds a. Yes _____ b. No _____

   Any oil, fats, or butter, or foods made with any of these a. Yes _____ b. No _____

   Any sugary foods such as sweets, candies, cakes, biscuits, chocolates a. Yes __ b. No _

   Others (specify meal or food) ……………….....

Qualify the food given:

   Carbs _____ Veges _____ Fruits _____

   Animal protein _____ Plant protein _____ Fats/ Oils ___ Sugary foods _____

MEDICAL EVALUATION

42. Has your child been sick in the last two weeks?
   a. Yes ___ b. No _____
   If Yes, what was the illness? _____

   Has your child suffered any of the illnesses listed below in the last two weeks?

43. Diarrhea in the last 2 weeks;
   a. Yes ___
   b. No ___
      If Yes, for what duration
   c. Less than 14 days ____

        d.   All the 14 days
        e.   Blood stain in stool Yes _____ No ___
44. Does the child have diarrhea today? Yes _____ No ___
    If Yes, check for dehydration
        a.   No ____ b. Some _____ c. Severe _____
45. Vomiting in the last two weeks; a. Yes ___ b. No _____
If Yes;

a. Vomits everything _____ b. Not everything ____

46. Is the child vomiting today?
        a.   Yes ___ b. No_____
47. Inability to drink/breast feed in the last two weeks:
        a.   Yes _____ b. No _____
48. Does the child have inability to drink/ breast feed today?
        a.   Yes _____ b. No_____
49. Cough in the last two weeks; a. Yes _____ b. No _____
    If Yes, How many days?
        a.   Less than 7 days _____ b. More than 7 days _____
50. Was there fast breathing?
        a.   Yes ___ b. No _____
51. Were there abnormal noises?
        a.   Yes ___ b. No _____
52. Is the child having cough today?
        a.   Yes ___ b. No _____
53. Does the child have Fast breathing today? (Count respiratory rate in 1 minute) RR ___
        a.   Yes _____ b. No _____
54. Are there abnormal noises today (Listen for abnormal noises)
        a.   Yes _____ b. No _____
55. Fever in the last two weeks;
        a.   Yes ___ b. No _____
56. Does the child have fever today? Record axillary temperature (   )
        a. Yes _____ b. No _____

EXAMINATION FINDINGS

57. Level of consciousness;   a. Alert _____ b. Not alert _____
58. Temperature (axillary) _____
59. Respiratory Rate (count number of breaths in one minute) _____
60. Visible severe wasting a. Yes _____ b. None _____
61. Dehydration   a. Severe _____ b. Some _____ c. None _____
62. Edema   a. Severe _____ b. Moderate _____ c. None _____
63. Tongue pallor   a. Pallor present _____ b. None _____
64. Appetite   a. Good _____ b. Poor _____
65. Open Skin Lesion;   a. None _____ b. Ulcers/abscess _____ c. Scabies ____
66. Motor milestones
Neck support _____ Sitting without support _____ Standing _____ Walking _____

Check level of milestone achievement according to age;

a. Appropriate ____ b. Delayed _____ c. Regressed _____

ANTHROPOMETRY MEASUREMENTS

(In a private room, weigh the child, measure the height/length and take MUAC. Take 2 measurement, calculate the average then record in the spaces provided)

67. Weight   _____ kg
68. Height/ Length   _____ cm
69. WHZ   _____ SD
70. MUAC   _____ cm

REVIEW ASSESSMENT   I   date   /   /

In the past 2 weeks,

71. Has your child been sick? Yes _ No ___
    a. If yes, what illness was it? _____
72. Has the child been admitted to hospital? Yes _ No ___
    a. If Yes, what was the reason for admission? _____
Has your child suffered any of the illnesses listed below?

73. Diarrhea   Yes ___ No ___
74. Blood in diarrhea   Yes ___ No ___
75. Vomiting   Yes ___ No ___
76. Inability to drink/ breast feed Yes ___ No ___
77. Cough   Yes ___ No ___
    a. If Yes, Was there fast breathing? Yes _ No ___
    b. Was there abnormal noises Yes _____ No ___
78. Fever Yes ____ No ___

79. How many meals did the child feed yesterday?
    a. One __ b. Two _____ c. Three_____ d. More than three __
80. List the foods given in the past 24 hours
    Porridge, ugali, bread, rice, or other foods made from grains a. Yes __ b. No _
    White potatoes, yams, cassava, or any foods made from roots a. Yes _ b. No _

    Pumpkin, carrots, or sweet potatoes a. Yes __ b. No _____

    Any dark green leafy vegetables a. Yes _____ b. No _____

    Ripe mangoes, ripe pawpaw, yellow fruits a. Yes ____ b. No _____

Any other fruits or vegetables a. Yes _____ b. No _____

Any meat, liver, kidney, heart, fish, or eggs   a. Yes _____ b. No _____

Cheese, yogurt, or other milk products a. Yes _ b. No _____

Any foods made from beans, peas, lentils, nuts, or seeds a. Yes _____ b. No _____

Any oil, fats, or butter, or foods made with any of these a. Yes _____ b. No _____

Any sugary foods such as sweets, candies, cakes, biscuits, chocolates a. Yes __ b. No _

Others (specify meal or food) ………………....

Qualify the food given:

Carbs _____ Veges _____ Fruits _____

Animal protein _____ Plant protein _____ Fats/ Oils ___ Sugary foods _____

81. How much Ready to use therapeutic foods (RUTF) given (packets) _____

82. How much of the RUTF has the child consumed since the last visit? (review by number of empty sachets brought back) _____

   a. Well (all) _____ b. Average (50-80%) _____

   c. Poor (less than 50%) ___ Reasons _____

EXAMINATION FINDINGS

83. Level of consciousness;   a. Alert _____ b. Not alert __
84. Temperature (axillary) _____
85. Respiratory Rate (count number of breaths in one minute) _____
86. Visible severe wasting a. Yes _____ b. None _____
87. Dehydration   a. Severe _____ b. Some _____ c. None _____
88. Edema   a. Severe _____ b. Moderate _____ c. None _____
89. Tongue pallor   a. Pallor present _____ b. None _____
90. Appetite   a. Good _____ b. Poor _____
91. Open Skin Lesion;   a. None _____ b. Ulcers/abscess _____ c. Scabies ____
92. Motor milestones
Neck support ____ Sitting without support _____ Standing ____ Walking _____

Check level of milestone achievement according to age;

a. Appropriate ___ b. Delayed _____ c. Regressed _____

ANTHROPOMETRY MEASUREMENTS

(In a private room, weigh the child, measure the height/length and take MUAC. Take 2 measurement, calculate the average then record in the spaces provided)

    93. Weight   _____ kg
    94. Height/ Length   _____ cm
    95. WHZ   _____ SD
    96. MUAC   _____ cm

REVIEW ASSESSMENT   II   date   /   /

In the past 2 weeks,

    97. Has your child been sick? Yes _ No ___
           a.   If yes, what illness was it? _____
    98. Has the child been admitted to hospital? Yes _ No ___
           a.   If Yes, what was the reason for admission? _____
Has your child suffered any of the illnesses listed below?

    99. Diarrhea   Yes ___ No ___
    100.   Blood in diarrhea   Yes ___ No ___
    101.   Vomiting   Yes ___ No ___
    102.   Inability to drink/ breast feed Yes ___ No ___
    103.   Cough   Yes ___ No ___
           a.   If Yes, Was there fast breathing? Yes _ No ___
           b.   Was there abnormal noises Yes _____ No ___
    104.   Fever Yes _____ No ___
    105.   How many meals did the child feed yesterday?
           b.   One ___ b. Two _____ c. Three_____ d. More than three ___
    106.   List the foods given in the past 24 hours
       Porridge, ugali, bread, rice, or other foods made from grains a. Yes ___ b. No _
       White potatoes, yams, cassava, or any foods made from roots a. Yes _ b. No _

       Pumpkin, carrots, or sweet potatoes a. Yes ___ b. No _____

       Any dark green leafy vegetables a. Yes _____ b. No _____

       Ripe mangoes, ripe pawpaw, yellow fruits a. Yes _____ b. No _____

       Any other fruits or vegetables a. Yes _____ b. No _____

       Any meat, liver, kidney, heart, fish, or eggs   a. Yes _____ b. No _____

       Cheese, yogurt, or other milk products a. Yes _ b. No _____

Any foods made from beans, peas, lentils, nuts, or seeds a. Yes _____ b. No _____

Any oil, fats, or butter, or foods made with any of these a. Yes _____ b. No _____

Any sugary foods such as sweets, candies, cakes, biscuits, chocolates a. Yes __ b. No _

Others (specify meal or food) ………………....

Qualify the food given:

Carbs _____ Veges _____ Fruits _____

Animal protein _____ Plant protein _____ Fats/ Oils ___ Sugary foods _____

107. How much Ready to use therapeutic foods (RUTF) given (packets) _____

108. How much of the RUTF has the child consumed since the last visit? (review by number of empty sachets brought back) _____

   a. Well (all) _____ b. Average (50-80%) _____

   c. Poor (less than 50%) ___ Reasons _____

EXAMINATION FINDINGS

109. Level of consciousness; a. Alert _____ b. Not alert _____

110. Temperature (axillary)   _____

111. Respiratory Rate (count number of breaths in one minute) _____

112. Visible severe wasting   a. Yes _____ b. None _____

113. Dehydration   a. Severe _____ b. Some _____ c. None _____

114. Edema   a. Severe _____ b. Moderate _____ c. None _____

115. Tongue pallor   a. Pallor present _____ b. None _____

116. Appetite   a. Good _____ b. Poor _____

117. Open Skin Lesion;   a. None _____ b. Ulcers/abscess _____ c. Scabies ____

118. Motor milestones

Neck support _____ Sitting without support _____ Standing _____ Walking _____

Check level of milestone achievement according to age;

a. Appropriate ____ b. Delayed _____ c. Regressed _____

ANTHROPOMETRY MEASUREMENTS

(In a private room, weigh the child, measure the height/length and take MUAC. Take 2 measurement, calculate the average then record in the spaces provided)

119. Weight _____ kg

120. Height/ Length _____ cm

121. WHZ _____ SD

122. MUAC _____ cm

COMPOSITE ANTHROPOMETRY MEASUREMENTS

	Measure	0	I	II
123.	Weight (kg)			
124.	Height/Length (cm)			
125.	Weight for Height Z score calculated			
126.	Left mid upper arm circumference (cm)			

INTERVENTION DONE

127. Antibiotics?   Amoxicillin _____ Other (specify) _____
128. Vitamin A   Yes _____ No _____
129. Vaccine Yes __(specify) _____ No __ (reason not given) _____
130. Other medicine given _____
131. Other intervention done _____
132. How much Ready to use therapeutic foods (RUTF)given (packets) _____
133. How much of the RUTF has the child consumed since the last visit? (review by number of empty sachets brought back) _____
a. Well (all) _____ b. Average (50-100%) .

c. Poor (less than 50%) ___ Reasons _____

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PART THREE

FINAL OUTCOME OF CHILD

134. Mean Weight Gain …………g/kg/day
135. WHZ on day 28 or at discharge from OTP
    a. Improved WHZ   – 3 SD to – 2 SD   ……
    b. Recovered WHZ   =/> – 2 SD   ……
136. MUAC on day 28 or at discharge from OTP
    a. Improved MUAC   11.6cm to 12.5cm   ………
    b. Recovered MUAC   >12.5cm   ………
137. Failure to respond;   Yes _____ No _____
138. Defaulted;   Yes _____ No _____
139. Inpatient admission; Yes _____ No _____
140. Died;   Yes _____ No _____

Compiled by

Name …………………………………………………………………………...

Sign ………………….   Date ………………

Primary Investigator …………………………...   Sign ……..………Date ……………...

Appendix 4: Questionnaire in Swahili (administered by researcher)
DODOSO –MASWALI KWA KISWAHILI (YANAYOSIMAMIWA NA MTAFITI)

SWALI LA UTAFITI

Matokeo ya muda mfupi ya watoto wenye umri wa miezi 6 hadi 59 wenye utapiamlo mkali uliofanyika katika Mpango wa Matibabu ya Nnje (OTP) katika Wilaya ya Kwale, Kenya

Maelekezo juu ya Kujaza Swali la Dodoso

Soma kila swali katika dodoso kwa wahojiwa na unukuu jibu katika nafasi iliyotolewa.

Weka jibu [√] kwa majibu yaliyotolewa kwa maswali yaliyofungwa. Ambapo maoni yanatakiwa, andika maoni yaliopeanwa na mhojiwa. Tafadhali kuwa kifupi na kueleweka kwa uhakika.

Usiandike jina la wahojiwa mahali popote kwenye dodoso.

Fanya kipimo na uchunguzi wa kimwili wa motto katika chumba cha faragha.

SEHEMU YA KWANZA

MAELEZO BINAFSI

Maelezo ya mgonjwa

Nambari ya Utafiti _____

1. Umri wa mgonjwa (kwa miezi)_____
2. Utaratibu wa uzazi_____
3. Jinsia: 1. Mwanaume_____ 2.Mwanamke_____
4. Makaazi (nukuu jina la kata ndogo au kijiji)_____
5. Umekaa muda gani katika makaazi yaliyotajwa? Miezi_____/Miaka_____

Maelezo ya mhojiwa (msimamizi wa mtoto)

6. Uhusiano na mgonjwa
a.Mama____b.Baba_____c.Nyingine_____(Taja uhusiano)

7. Umri wa msimamizi wa mtoto (Miaka) _____
8. Ngazi ya elimu rasmi ya msimamizi wa mtoto.
a. Hakuna_b.Msingi Sio kamili_____c. Msingi Kamili_____

d.Sekondari Sio kamili ____e.Sekondari Kamili_____ f. Elimu ya Juu_____

9. Hali ya ndoa ya msimamizi wa mtoto
a. Bila ndoa_____b.Kwenye Ndoa_____c.Mke mmoja_____d. Wake wengi .

e.Mjane____f.Kutengana _____g.Talaka_____

10. Kazi/chanzo cha mapato ya msimamizi wa mtoto
a.Kazi ya rasmi_____b.Kazi isio rasmi _____c. Bila kazi_____

HISTORIA YA KIJAMII

Uchunguzi wa kiuchumi wa kijamii

11. Ni nani tegemeo kuu la kipato (taja uhusiano wake na mtoto katika utafiti)_____
12. Mapato ya kila mwezi (Ksh)ni kiasi gani?_____
a.>20,000__b.15,000 – 20,000____c.10,000 – 15,000_____

d.5,000 – 10,000___e.3,000 – 5,000_f.<3,000_____g.Sijui_____

13. Ni watu wangapi wanaoishi ndani ya nyumba mara kwa mara?
14. Ni wangapi wanaoishi nyumbani ni watoto chini ya umri wa miaka 5?
15. Nini vifaa vinavyotumiwa kutengeza kuta za nyumba?
a.Sio vya kudumu(nyasi)__

b. Kudumu kiasi (matope/mbao)_

c. Vya kudumu kwa muda mrefu (jiwe/matofali)_____

16. Kuna vyumba vingapi ndani ya nyumba?_____
17. Ni aina gani ya kawaida ya kujisaidia haja kubwa kwa familia?
a.Choo cha maji___b. Choo cha shimo____c.Kichaka ____ d. Nyingine_____

18. Nini chanzo kikuu cha maji kwa familia?
a.Maji ya bomba kwa jumuiya _____b.Maji ya bomba kwa nyumba_____

c.Bwawa _____d.Mto/mkondo_____e.Nyingine_____

Tathmini ya kijamii ya kitamaduni

19. Katika umri gani wa mtoto inafaa kumuongezea chakula kingine mbali na kunyonya? (umri katika miezi)_____
20. Ni aina gani ya chakula cha kumuongezea mtoto?_____

_____

21. Ni mara ngapi kwa siku mtoto anapaswa kulishwa chakula hiki cha ziada ambacho unataja hapo juu?_____
22. Je, kuna wakati maalum wa siku ambapo mtoto anapaswa kula vyakula maalum?
Ndio_____ La _____

Ikiwa *ndio* taja

.... Je, watoto wanaruhusiwa kushiriki chakula kutoka kwa sahani moja?

Ndio_____ La_____

HISTORIA YA MATIBABU YA ZAMANI

23. Je, mtoto amewahi lazwa hospitali?Ndio_____ La_____

        Ikiwa *ndio*,mara ngapi?_____

24. Ni sababu gani ya kulazwa hospitali?

        a.   Ugonjwa ulidumu chini ya wiki 2_____

        b.   Ugonjwa wa kudumu zaidi ya wiki 2__(tafadhali taja ugonjwa gani)_____

Hali ya chanjo – angalia kadi ya chanjo kama inapatikana

Chanjo	0	1	2	3
25. BCG				
26. Polio (OPV)	Birth			
27. Pentavalent (DPT/DTaP)				
28. Pneumonia				
29. Kuharisha/ Rota				
30. Ukambi/ measles				
31. Chanjo ya ziada (taja)				

32. Historia yoyote ya ugonjwa sugu? Ndio_____ La_____

a. Kifua kikuu _____b.HIV/AIDS_____

c. Ingine (taja)_____

33. Uzito wa mtoto umekuwaje katika miezi tatu (3) iliyopita? (angalia kadi ikiwa inapatikana)

        a.   Kuongeza uzito_____

        b.   Kupoteza uzito_____

        c.   Hakuna mabadiliko_____

SEHEMU YA PILI

HISTORIA YA CHAKULA

34. Je, mtoto huyo amewahi kunyonyeshwa? Ndio_____ La_____
Ikiwa La (hakunyonya), sema sababu
....

Kama ndiyo,

35. Je, mtoto huyu alinyonya kwa muda gani bila kuongezea chakula kingine?
a. Umri chini ya Miezi 6___b. Umri wa Miezi 6_____c. Umri zaidi ya miezi 6_____

36. Je,mtoto huyu bado ananyonya?Ndio_____Hapana*sahihi_____, sio sahihi ____
37. Je, umeanzisha chakula kingine kwa mtoto huyu?Ndio_____ La____
38. Ni chakula mara ngapi unalisha mtoto wako katika siku yote?
      a. Moja_____b.Mbili_____c.Tatu_____d.Zaidi ya tatu_____
39. Mtoto alikula mlo mara ngapi jana?
      a. Moja_____b.Mbili_____c.Tatu_____d.Zaidi ya tatu_____
40. Orodha ya vyakula vinavyopewa kila mlo
Mlo 1...

Mlo 2...

Mlo 3...

Mlo mwengine (taja mlo au chakula).....................

TATHMINI YA MATIBABU

41. Je, mtoto wako amekuwa mgonjwa katika wiki mbili zilizopita?
      a. Ndio_____ b. La_____
      Ikiwa *Ndio*, ugonjwa ulikuwa ni nini?_____

Je, mtoto wako alipata magonjwa yaliyonakiliwa hapa chini katika wiki mbili zilizopita?

42. Kuharisha katika wiki mbili zilizopita ;
      a. Ndio_____
      b. La_____
      Ikiwa *ndio*, ameharisha kwa muda gani?
      c. Chini ya siku14_____
      d. Zaidi ya siku 14_____
      e. Damu katika choo? Ndio_____Hapana
43. Je, mtoto anaharisha leo?Ndio_____ La_____
Ikiwa Ndio, angalia upungufu wa maji mwilini.

a. Hakuna upungufu _____ b. Upungufu kiasi ___ c. Upungufu mwingi _____

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44. Kutapika katika wiki mbili zilizopitaa; a.Ndio__b.Hapana_____
Kama *ndio*;

a.hutapika kila kitu_____b.Sio kila kitu_____

45. Je, mtoto yuatapika leo?
       a. Ndio_____ b. La_____
46. Kukosa nguvu ya kunywa/kunyonya wakati wa wiki mbili zilizopita:
       a. Ndio_____b. Hapana_____
47. Je, mtoto hawezi kunywa/kunyonya maziwa leo?
       a. Ndio_____ b. La_____
48. Kukohoa katika wiki mbili zilizopita; a. Ndio__ b. La _____
    Kama *ndio*, amekohoa kwa siku ngapi?
       a. Chini ya siku 7_____b. Zaidi ya siku 7_____
49. Je, kulikuwa na kupumua haraka?
       a. Ndio_____ b. La_____
50. Je, Kulikuwa na sauti zisizo za kawaida?
       a. Ndio_____ b. La_____
51. Je, mtoto anakikohozi leo?
       a. Ndio_____ b. La_____
52. Je mtoto anapumua haraka leo? (Hesabu ya kupumua kwa muda wa dakika moja) RR_____
       a. Ndio_____b.Hapana_____
53. Je kuna sauti zisizo za kawaida leo? (Sikiliza sauti zisizo za kawaida)
       a. Ndio_____b.Hapana_____
54. Joto la juu katika wiki mbili zilizopita;
       a. Ndio_____ b. La_____
55. Je, mtoto huyu anajoto leo? Rekodi ya nyuzi joto ya kwapa (__)
a. Ndio_____b.Hapana_____

MATOKEO YA UCHUNGUZI

56. Kiwango cha ufahamu/ uchangamfu; a.Ako macho _____b. Hayuko macho _____
57. Joto la kwapa _____
58. Kiwango cha kupumua (kuhesabu idadi ya pumzi kwa muda wa dakika moja)_____
59. Kuonekana wazi kwa kukonda; a. Ndio_____b.Hakuna_____
60. Ukosefu wa maji mwilini; a.Mwingi_____b. Kiasi _____c.Hakuna_____
61. Kufura mwili;   a. Zaidi _____b.Kiasi c.Hakuna_____
62. Weupe wa ulimi;   a. Upo weupe _____b.Hakuna_____
63. Hamu ya kula; a.Nzuri_____b.Mbaya _____
64. Hali ya ngozi;a.Nzuri _____b.Vidonda/chungu_____c.Upele _____
65. Kukomaa kwa viungo na kutembea
Kujizuwia shingo _____Kuketi bila kushikiliwa Kusimama ___ Kutembea ___

Angalia kiwango cha mafanikio makubwa cha kukomaa kulingana na umri;

a.Sahihi___ b. Imechelewa_____c. Imerudi nyuma ____

VIPIMO VYA AFYA YA LISHE

(Katika chumba cha faragha, pima uzani wa mtoto, urefu, chukua upana wa katikati wa mkono wa kushoto (MUAC) na urekodi kwenye nafasi zinazo tolewa)

	Kipimo	1	2	3	Wastani
66.	Uzani (kg)				
67.	Urefu (cm)				
68.	Uzani kwa Urefu (WHZ score)				
69.	MUAC mkono wa kushoto				

HUDUMA ILIYOFANYWA

70. Antibiotics?   Amoxicillin_____Nyingine (taja)_____
71. Vitamini A   Ndio_____   Hapana_____
72. Chanjo?   Ndio__(taja)_____Hapana (taja sababu) _____
73. Dawa nyingine iliyopeanwa _____
74. Matibabu mengine yaliofanywa _____
75. Ni kiasi gani ya Lishe ya Matibabu (RUTF) iliyopeanwa (pakiti)_____
76. Ni kiasi gani cha RUTF ambacho mtoto alitumia tangu ziara ya mwisho? (Linganisha na idadi ya pakiti tupu zilizoletwa na msimamizi wa mtoto)_____
a.Vizuri (zote)_____b.Kati na kati(50-100%)_____

c.Mbaya (chini ya 50%)_____Sababu?_____

SEHEMU YA TATU

MATOKEO YA MWISHO YA MTOTO

77. Kiasi cha kuongezeka uzani   ....g/kg/day
78. WHZ siku ya 28 au kutolewa kutoka kwa OTP
    a. Imeboreka   WHZ   – 3SD had – 2SD   _____
    b. Kupona   WHZ   =/>-2SD   _____
79. MUAC siku 28 au kutolewa kutoka kwa OTP
    a. Imeboreka   MUAC 11.6cm hadi 12.5cm   _____
    b. Kupona   MUAC>12.5cm   _____
80. Kukosa kupona au kuboreka   _____
81. Kutoweka kabla kumaliza kliniki   _____
82. Kulazwa hospitali;   Ndio _____ La _____
83. Alikufa;   Ndio _____ La _____
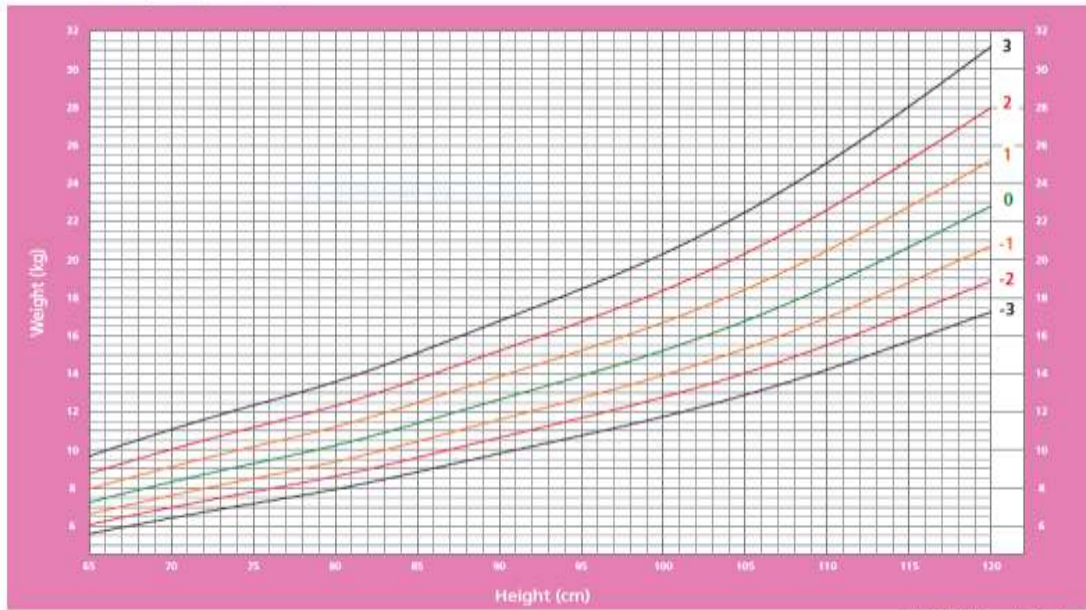

Jina la mwenye kuelekeza dodoso ....
Sahihi...................Tarehe………………

Mtafiti Mkuu...Sahihi ....Tarehe……………...

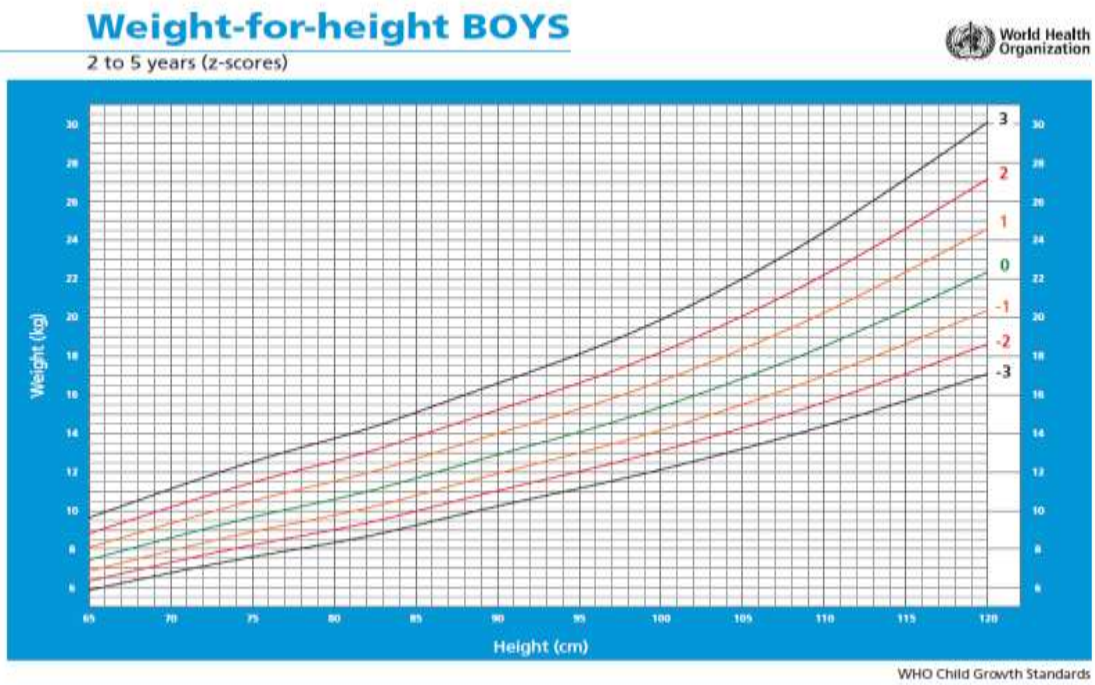**Appendix 5: WHO Growth Standards, Weight for Height Z scores, Girls 2 - 5 years**

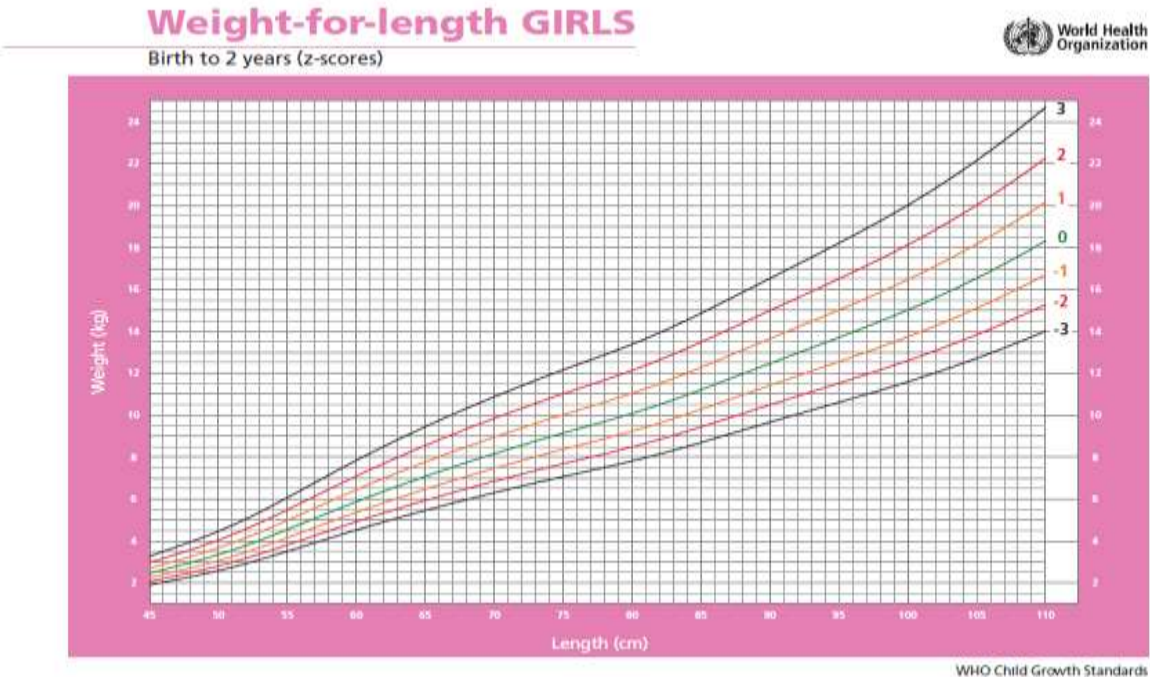Weight-for-Height GIRLS
2 to 5 years (z-scores)

WHO Child Growth Standards

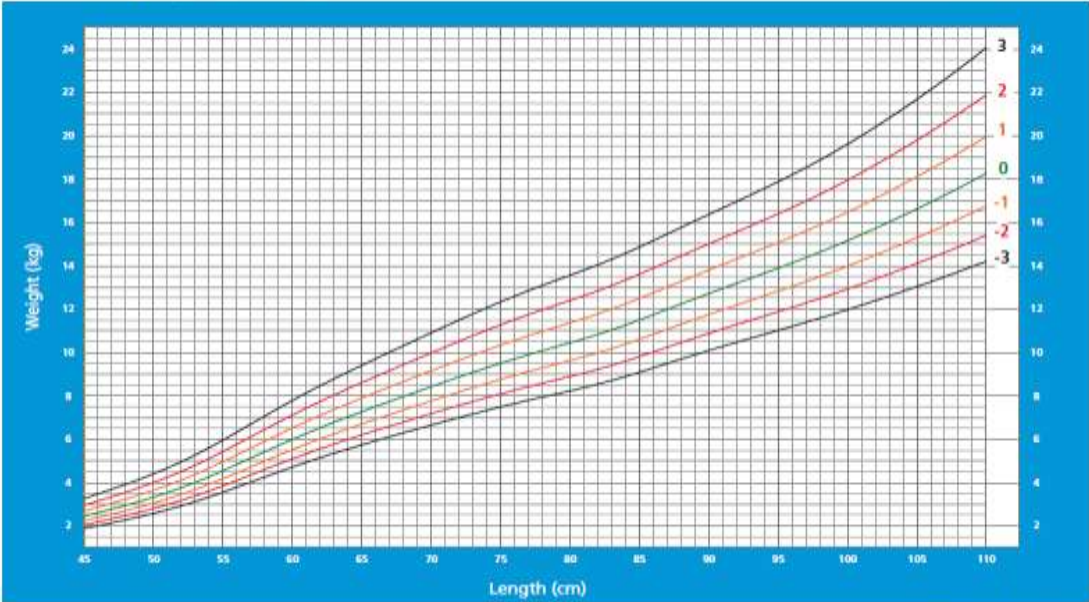**Appendix 6: WHO Growth Standards, Weight for Height Z scores, Boys 2 - 5 years**

Appendix 7: WHO Growth Standards, Weight for Length Z scores, Girls 0 - 2 years

Appendix 8: WHO Growth Standards, Weight for Length Z scores, Boys 0 - 2 years

Appendix 9: The Appetite Test
Procedure

Conduct the test to the child under study in a quiet area with help of the care giver.

Wash your hands using clean water. The care giver to wash their hands too.

Have the care giver sit comfortably, holding the child on the laps.

Offer the RUTF from its sachet or put a little paste on a finger and give the child to eat.

Be gentle and encourage the child politely to eat the RUTF offered. Do not force the child.

Offer the child clean water to drink within and at the end of the session.

A session takes 30 minutes.

Results of Appetite Test –

Body weight (kg)	Sachet of RUTF consumed to pass appetite test
< 4	1/8 – 1/4
4 – 10	1/4 –1/2
10 – 15	1/2 –3/4
>15	3/4 – 1

Appendix 10: Windows of achievement of motor milestones in children, WHO Growth reference (4)

Motor milestone	Left-bound	Box boundary (age in months) 95% C.I.		Right-bound	95% C.I.	
		Lower	Upper		Lower	Upper
Sitting without support	3.8	3.7	3.9	9.2	8.9	9.4
Standing with assistance	4.8	4.7	5.0	11.4	11.2	11.7
Hands-&-knees crawling	5.2	5.0	5.3	13.5	13.1	13.9
Walking with assistance	6.0	5.8	6.1	13.7	13.4	14.1
Standing alone	6.9	6.8	7.1	16.9	16.4	17.4
Walking alone	8.2	8.0	8.4	17.6	17.1	18.0

Appendix 11: Map of Kwale County (29)
Large dots depict study sites, namely Kinango Sub County, Kwale Sub County, and Msambweni County referral hospitals, and road network for accessibility.